NOTICE

All drawings located at the end of the document.

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Annual Update for the Historical Release Report

RF/RMRS-99-428.UN

September 1999

1/173

ANNUAL UPDATE

FOR AUGUST 1, 1998 THROUGH
AUGUST 1, 1999

HISTORICAL RELEASE REPORT (HRR)

Prepared By

Rocky Mountain Remediation Services, L.L.C.
and
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RF/RMRS-99-428.UN
Revision 0

AGENCY ACCEPTANCE FORM
HRR ANNUAL UPDATE

The recommendations of the Department of Energy (DOE) with regard to the need for future actions, or the lack of the need for future actions, are included in each PAC narrative description included in this annual update Any IHSS or PAC for which a decision is deferred will be addressed in future HRR updates

Exceptions to the recommended actions should be noted below or attach comments to this form as needed

_____

_____

_____

_____

Please provide comments and/or acceptance within 30 days from receipt of annual update submittal, or the document will be considered acceptable as is

DOE Signature	**CDPHE Signature**	**EPA Signature**
	CDPHE agrees with recommendations CDPHE disagrees with recommendations, see comments	EPA agrees with recommendations EPA disagrees with recommendations, see comments
_____	_____	_____
_____	_____	_____
DOE Concurrence	CDPHE Signature and Position	EPA Signature and Position

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APPENDIX(S)

ABBREVIATIONS, ACRONYMS, AND INITIALISMS

ALF	Action Level and Standards Framework for Surface Water & Soils
AME	Actinide Migration Evaluation
AOC	Area of Concern
ARA	Accelerated Response Action
BGS	Below Ground Surface
CAD/ROD	Corrective Action Decision/Record of Decision
CDPHE	Colorado Department of Public Health and Environment
CEARP	Comprehensive Environmental Assessment & Response Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Ci	Curies
cm	square centimeters
cpm	counts per minute
D&D	Decontamination and Decommission
dpm	disintegrations per minute
D/P/G	Disintegrations Per Minute Per Gram
DNAPL	dense nonaqueous phase liquid
DOE	U S Department of Energy
EG&G	EG&G Rocky Flats, Inc
EPA	U S Environmental Protection Agency
ERA	Ecological Risk Assessment
ER	Environmental Restoration
FIDLER	Field Instrument for the Detection of Low-Energy Radiation
ft	foot/feet
ft^2	square feet
FY	Fiscal Year
g	grams
GPS	Global Positioning System
HDPE	High Density Polyethylene
HI	Hazard Index
HEPA	High Efficiency Particulate Air
HHRA	Human Health Risk Assessment
HPGe	High Purity Germanium
HRR	Historical Release Report
IHSS	Individual Hazardous Substance Site
IAG	Interagency Agreement
IM/IRA	Interim Measure/Interim Remedial Action
IMP	Integrated Monitoring Program
ITS	Interceptor Trench System
ITPH	Interceptor Trench Pump House
IWCP	Integrated Work Control Package
µCi/g	microcuries per gram
µg/Kg	micrograms per kilogram (ppb)
µg/L	micrograms per liter (ppb)

ABBREVIATIONS, ACRONYMS, AND INITIALISMS
(continued)

mg/Kg	milligrams per kilogram (ppm)
mg/L	milligrams per liter (ppm)
MDL	Method Detection Limit
MST	Modular Storage Tank
nCi/g	nanocuries per gram
NFA	No Further Action
NRC	National Response Center
NTS	Nevada Test Site
OPWL	Original Process Waste Lines
OU	Operable Unit
PA	Protected Area
PAC	Potential Area of Concern
PAM	Proposed Action Memorandum
PARCC	Precision, Accuracy, Representativness, Completeness, and Comparability
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
pCi/g	picocuries per gram
PCOC	Potential Contaminant of Concern
POC	Point of Compliance
POE	Point of Evaluation
ppb	part per billion (µg/Kg or µg/L)
ppm	part per million (mg/Kg or mg/L)
PPRG	Programmatic Preliminary Remediation Goal
PSZ	Perimeter Security Zone
PU&D	Property Utilization and Disposal
RCRA	Resource Conservation and Recovery Act
RCRA 3004(u)	Appendix 1, Waste Management Units RCRA Part B Permit Application
RFCA	Rocky Flats Cleanup Agreement
RFFO	Rocky Flats Field Office
RFETS	Rocky Flats Environmental Technology Site
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFP	Rocky Flats Plant
RI	Remedial Investigation
RMRS	Rocky Mountain Remediation Services, L L C
RQ	Reportable Quantity
SAP	Sampling and Analysis Plan
SEP	Solar Evaporation Pond
SID	South Interceptor Ditch
SITE	Superfund Innovative Technology Evaluation
SNM	Special Nuclear Material
STP	Sewage Treatment Plant

ABBREVIATIONS, ACRONYMS, AND INITIALISMS
(continued)

SVOC	Semivolatile Organic Compound
SWD	Soil Water Database
SWMU	Solid Waste Management Unit
TCA	1,1,1-trichloroethane
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
UBC	Under Building Contamination
VOC	Volatile Organic Compound
yd^3	cubic yards

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SECTION 1.0
INTRODUCTION

1.0 INTRODUCTION

Background

The Rocky Flats Environmental Technology Site (RFETS) began operation in 1951 Since 1951, materials defined as hazardous substances, pollutants, and contaminants by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and materials defined as hazardous waste and hazardous constituents by the Resource Conservation and Recovery Act (RCRA) and/or the Colorado Hazardous Waste Act (CHWA), have been produced, purchased, stored, consumed, disposed, and released at various locations at RFETS Contaminants remain within some facility tank and pipe systems and filter plenums Certain contaminants have been detected and remain in groundwater, sediments, surface water and soils at the Site and thus pose potential human health and environmental risks

RCRA regulations require that all Solid Waste Management Units (SWMUs) be identified This became applicable to RFETS with the signing of a Compliance Agreement, on July 31, 1986 At that time, the exact definition of a SWMU had not been formalized, therefore, guidance from the State of Colorado and the regional office of the U S Environmental Protection Agency (EPA) was used The State of Colorado and the EPA required the identification of all areas where environmental releases may have occurred including hazardous waste and non-hazardous waste-related releases Also included were single-release areas and long-term management areas where waste storage may have occurred

SWMUs were initially identified in 1985 by the Los Alamos operations office and presented in the Draft Comprehensive Environmental Assessment and Response Program (CEARP) Phase I Installation Assessment The study consisted of a record search, an open literature survey, and interviews with RFETS employees The SWMU terminology is a RCRA designation consisting of inactive waste disposal sites, accidentally contaminated sites, and sites found to pose environmental concern due to past or current waste management practices Inspections were conducted on each site The first identification of RFETS SWMUs, consistent with the guidance provided by the State of Colorado and the regional EPA, was presented as an appendix to the November 1986 RCRA Part B Permit Application

Formal efforts to document the extent of Site contamination were established with the signing of the Interagency Agreement (IAG) in 1991 At that time, SWMUs at RFETS were re-named as Individual Hazardous Substance Sites (IHSSs) IHSS is a term defined under CERCLA and the IAG as "locations associated with a release or threat of release of hazardous substances which may cause harm to human health/or the environment" The term IHSS is used today at RFETS The IAG grouped IHSSs into 16 larger Operable Units (OUs) by similar contaminant or geographical location and schedules were set for further characterization

In accordance with the IAG, a Historical Release Report (HRR) was developed The original intent of the HRR was to capture existing information on historical incidents and plant practices involving hazardous substances at RFETS Additionally, the IAG prescribed that the HRR reporting process continue quarterly for reporting of new or newly identified releases of hazardous substances to the environment (now identified as Potential Areas of Concern or PACs)

In 1996, the Rocky Flats Cleanup Agreement (RFCA) was signed superceding the IAG RFCA incorporated the earlier IAG requirements for updating the HRR, however it was agreed that reporting would be required on an annual basis instead of quarterly The first Annual Update was submitted in September 1996

RFCA also consolidated the 16 OUs designated in the IAG into 10 OUs to reduce process and administrative requirements The OUs resulting from the consolidation are presented in Table 1 1 below

Table 1.1 RFCA Consolidation of Former Operable Units

Interagency Agreement Operable Unit Designation	RFCA Operable Unit Designation
[illegible]	[illegible]
Operable Unit 2	Incorporated into Buffer Zone Operable Unit
[illegible]	[illegible]
Operable Unit 4	Incorporated into Industrial Area Operable Unit
Operable Unit 5	Unchanged Under RFCA
Operable Unit 6	Unchanged Under RFCA
Operable Unit 7	Unchanged Under RFCA
Operable Unit 8	Incorporated into Industrial Area Operable Unit
Operable Unit 9	Incorporated into Industrial Area Operable Unit
Operable Unit 10[1]	[1]Incorporated into Industrial Area Operable Unit
[illegible]	[illegible]
Operable Unit 12	Incorporated into Industrial Area Operable Unit
Operable Unit 13	Incorporated into Industrial Area Operable Unit
Operable Unit 14	Incorporated into Industrial Area Operable Unit
[illegible]	[illegible]
[illegible]	[illegible]

Note Shading Indicates Official Closure of Operable Unit
[1] IHSSs 170, 174A ,174B and 177 within former Operable Unit 10 are in Buffer Zone Operable Unit

At that time, Corrective Action Decisions/Record of Decisions (CAD/RODs) for OUs 11, 15, and 16 were already complete and OUs 1, 3, 5, 6, and 7 were nearing completion For this reason these OUs retained their IAG designations The Buffer Zone OU incorporates all IHSSs from OU 2, IHSSs 170, 174A, and 174B from the former OU 10, and, all PACs within those IHSSs and the Buffer Zone The Industrial Area OU incorporates all IHSSs from OUs 4, 8, 9, 12, 13, 14, IHSSs 115 and 196 from OU 6, all IHSSs from OU 10 with the exception of 170, 174A, and 174B, and all PACs within those IHSSs and the Industrial Area

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Organization of this Annual Update to the HRR

This Annual Update to the HRR provides a variety of information pertaining to spills, releases, or findings of contaminants at RFETS during the reporting period for August 1, 1998 through August 1, 1999 A large portion of the text specifically addresses new information gathered to update older IHSS or PAC descriptions This annual update is prepared in accordance with Part 9, Subpart B, paragraph 119 (l) of RFCA (DOE, 1996) Notification of spills, releases, or findings and is presented in the following format

- An assigned PAC Reference Number
- IHSS Number (if applicable)
- Unit Name
- Approximate Location
- Date(s) of Operation or Occurrence
- Description of Operation or Occurrence
- Physical/Chemical Description of Occurrence
- Fate of Constituents Released to the Environment
- Action/No Further Action Recommendation
- Comments
- References

For purposes of the HRR process and mapping clarity, original IHSS locations were designated a unique "PAC Area" prefix number based upon geographic location An area where there has been a recent release or finding of a hazardous substance to the environment (i e , since 1992) is also assigned a PAC area prefix number followed by the next numerically highest release number for that area. These areas are referred to as PACs and are similar to IHSSs in that they are CERCLA sites requiring disposition through the HRR and CERCLA reporting process

PAC prefixes are selected according to 14 geographical subdivisions as illustrated on Figure 1-1 Large PAC areas (i e , PACs which cross geographic PAC boundaries) such as the Original Process Waste Lines (OPWL) (PAC #000-121) and the Central Avenue Waste Spill (PAC #000-172) have been assigned a 000 prefix for clarification This Annual Update contains three "new" PAC locations and hence, are sequentially assigned numbers PAC Area 000-504, PAC Area 000-505, and PAC Area SE-1602

In addition to the 14 geographic areas, potential Under Building Contamination (UBC) sites were also discussed in the original HRR (DOE, 1992) UBC areas were necessary due to the potential contamination of soil and/or groundwater identified or suspected under specific buildings from broken process waste lines or other sources Plate #4, Potential Areas of Concern, illustrates the UBC locations identified at RFETS

PAC narratives include U S Department of Energy (DOE) Rocky Flats Field Office (RFFO) recommendations for further action or No Further Action (NFA) warranted These recommendations are based on process knowledge, analytical data, conservative risk-based

screens, or formally conducted personal interviews RFCA defines NFA as the determination that remedial actions are not presently warranted, however, such decisions are subject to revisitation at the time of the Final CAD/ROD The Agency Acceptance Form, included as the second page of this document, will continue to be incorporated into the annual reporting process Signatures on this form document regulatory agency concurrence or non-concurrence with DOE-RFFO recommendations

Section 1.0 (this section) provides the evolutionary history of the HRR and describes the content of this document

Table 1 2, HRR Site Tracking Status through August 31, 1999, is located at the end of this Section, and is an up-to-date account of the number of IHSSs and PACs officially closed out either by written direction from the regulatory agencies or through the Corrective Action Decision/Record of Decision (CAD/ROD) process, the number of IHSSs and PACs "proposed" for NFA since the 1992 HRR, and finally, the number of total CERCLA sites warranting further research and/or investigation

Section 2.0 presents newly identified PACs identified due to releases, spills (or findings) to the environment during the reporting period from August 1, 1998, through August 1, 1999 New PACs are defined as newly identified or suspected releases for which DOE, RFFO has notified the Environmental Protection Agency (EPA) and Colorado Department of Public Health and the Environment (CDPHE)

Section 3.0 provides PAC revisions and incorporates new information regarding previously designated IHSSs and/or PACs The revised narratives include

- Additional information or findings related to previously designated CERCLA sites such as new data, boundary changes, corrections identified, etc ,
- Proposed NFA status based upon process knowledge, analytical data, conservative risk-based screening, source removal (or approved treatment) of contaminants in accordance with Agency approved Proposed Action Memorandums (PAMs), Interim Measure/Interim Remedial Action (IM/IRA), or other authorizing documentation,
- Approved NFA status based upon final CAD/ROD or other authorizing documentation such as letters from the Regulatory Agencies, and
- Accelerated actions taken within the Environmental Restoration (ER) framework of field activities

Section 4.0 briefly describes events that occurred at Rocky Flats during the reporting period which are considered significant and should be documented

Appendix 1 provides a list of all sites identified in the original HRR, quarterly updates, and annual updates A cross-reference with IHSS number (if applicable), IHSS numbers for PACs occurring within an IHSS boundary, and OU designation is provided in accordance with RFCA Additionally, Appendix 1 provides a reference to quarterly or annual reports updating the information provided in the original PAC identification Designation of a PAC as Proposed NFA or Approved NFA is also provided along with the reference to the quarterly or annual report the designation was assigned New PACs and PAC or IHSS revisions inclusive to this annual report are highlighted in Appendix 1

Appendix 2 has been added to track HRR correspondence from the regulatory agencies During this reporting period, two letters were received from the Agencies (dated July 9, 1999) to the DOE providing important information specific to the HRR The letters are specific only to the 1997 and 1998 HRR Annual Reports Resolution of issues and disposition of the subject PACs and IHSSs will be addressed through ongoing discussions with the Agencies In brief, the letters "conditionally" document acceptance of proposed NFA status, request additional information or data for some PACs or IHSSs which were proposed NFA or establish non-concurrence with PACs or IHSSs proposed for NFA in the HRR reporting process

Appendix 3 is identified as place-keeper to describe and map any locations where potentially RCRA hazardous soil has been placed back into an excavation (with approval from the Agencies) as a result of a non-RFCA generation process such as repair of a waterline The CDPHE stated on January 12, 1998, that for a "defacto" delisting determination of soils containing listed waste, that 10^{-6} health risk-based numbers for direct contact by a resident could be used This type of activity occurred once in the 1998 reporting period resulting in PAC 700-1117 (with NFA status) There were no similar activities occurring for the1999 reporting year and therefore, Appendix 3, Figure A-3 is unchanged from the 1998 HRR Annual Report

Appendix 4 contains a series of four maps (Plates) The plates included in this update have been reviewed for accuracy and compared to information compiled and documented during the investigation processes The RFCA Consolidated Operable Unit map submitted with RFCA and the original HRR PAC Area format were combined and illustrated as Plate #1 Plate #1 only illustrates IHSSs for which further investigation or action is warranted (as proposed in the HRR reporting process) NFA and proposed NFA IHSSs and PACs are illustrated on a separate coverage (Plate #2) thereby easily delineating between the IHSSs which require further action and progress made toward site cleanup In addition, due to the complex nature of the OPWL and associated IHSSs, an additional map (Plate #3) illustrates the OPWL system as a stand-alone area requiring further investigation This annual report identifies New Process Waste Lines (NPWLs) as a PAC requiring further investigation (PAC 000-504) The new process waste lines have been placed on Plate 3 (in a different color) The PAC and UBC map (Plate #4) is consistent with past HRR Update Reports and shows PACs/UBCs which require further action

Summary

In summary, this report is intended to provide a comprehensive compilation of historical information updated to reflect present conditions and response actions at the RFETS with regard to environmental releases or significant events It is not the intention for this annual update or past updates to change or amend researched information in the original HRR but rather to provide additional facts for specific areas, as they become available Prior to initiating work within any designated area, all available documents should be reviewed including but not limited to Environmental Technical Memorandums, Data Summary Reports, project specific decision documents, and Accelerated Action Completion Reports

For information regarding groundwater contaminant plumes and surface water monitoring at RFETS, refer to the Annual RFCA Groundwater Monitoring Reports and the Interim Measures/Interim Remedial Actions (IM/IRA) for the Industrial Area annual report(s)

Table 1.2 HRR Site Tracking and Status Through August 31, 1999[1]

Official Closures through CAD/ROD Process (or other approval)	**64**
CAD/ROD Specifies Deferral Action for IHSS Until D&D	**5**
Proposed No Further Actions	**115**
Potential Further Action Warranted	**177**
Total	**361**

[1] Tracking includes IHSSs, PACs, and UBCs at RFETS

SECTION 2.0

NEW PAC NARRATIVES

(PACS IDENTIFIED FROM AUGUST 1, 1998 THROUGH AUGUST 1, 1999)

PAC REFERENCE NUMBER: 000-504

IHSS Number Not Applicable

Unit Name New Process Waste Lines

Approximate Location RFP Main Production Facility

Date(s) of Operation or Occurrence

1984 to Present

Description of Operation or Occurrence

The New Process Waste Lines (NPWL) consist of a network of underground pipelines and tanks that transport liquid waste streams to Building 374 Waste Treatment Operations The NPWL overlap the Original Process Waste Lines (OPWL) in many places (see Plate 3) and for the most part, replace the OPWL infrastructure Installation of the NPWL system was required primarily due to the deterioration of the OPWL, installed in 1952 The installation of the NPWL was completed in 1984 Some of the OPWL lines have been converted to NPWL and all NPWL are double contained

Physical/Chemical Description of Constituents Released

The NPWL transport a variety of waste streams to Building 374 These current and past waste streams include laundry water, non-radioactive/chemical laboratory waste, uranium and beryllium waste, polychlorinated biphenyls (PCBs), solar pond water, incidental water, high nitrate waste from Building 774, and waste from site laboratories and utilities Potential contaminants of concern include acids, bases, solvents, radionuclides, PCBs, metals, oils, and photographic laboratory chemicals

Releases from NPWL have been documented at several PACs and are summarized in Table 2 1 (DOE 1992)

Table 2.1 Documented Releases from New Process Waste Lines

PAC/IHSS	Description	PCOCs
100-611	Building 123 Scrubber Solution Spill	Nitric acid, hydrofluoric acid, hydrochloric acid
300-186	Valve Vaults 11, 12, and 13	Nitrate, radionuclides, acids
700-147 1	Process Waste Line Leaks	Nitrate, radionuclides

PCOC – Potential Contaminant of Concern

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Surface soil sample analyses conducted as part of the OU 13 RFI/RI indicated that americium-241 and plutonium 239/240 were above background Metals were not analyzed at this location (DOE, 1995)

OPWL pipelines P-1, P-7, and P-54 overlap with NPWL and have been identified as areas of reported release (DOE 1992) Potential waste streams associated with these pipelines are listed in Table 2 2

Table 2.2 Potential Waste Streams in Overlapping OPWL and NPWL

Line Number	Building	Description	Waste
P-1	123	Lines exiting south of the west annex of Building 123 were converted to NPWL	Acids, bases, solvents, Pu, Am, U, Be, PCBs, ammonium thiocyanate, ethylene glycol
P-7	881	South and beneath Building 881 to Building 887	Acids, bases, solvents, Pu, Am, U, Cr, Ni, Fe, Hg, Mo, Mn PCBs, oils,
P-54	881	South and west of Building 887 to Building 881	Acids, bases, solvents, Pu, Am, U, Cr, Ni, Fe, Hg, Mo, Mn PCBs, oils
P-56	771/774	771/774 tunnel	Acids, bases, solvents, Pu, Am, U, Ce, Cr, Cu, Fe, Hg, Ni, Pb, Ta, Ti, PCBs, oils, chlorides, photo lab waste

Responses to Operation or Occurrence

Spilled materials at 100-611 were containerized and transferred into the Building 123 process waste system on November 7, 1989 Responses to occurrences at Valve Vaults 11, 12, and 13 have included repairing valve vaults and piping and removing contaminated soils Contaminated soils at 700-147 1 were excavated and removed

No documentation was found which detailed responses to potential leaks at P-1, P-7, or P-56

Fate of Constituents Released to Environment

No documentation was found which detailed the fate of constituents released to the environment at NPWL PACs, P-1, P-7, or P-56

Action/No Further Action Recommendation

This PAC will be studied in accordance with the 2006 Baseline in IA Group 000-4

Comments
None

References

DOE, 1992, *Historical Release Report*, Rocky Flats Plant, Golden, CO, January

DOE, 1994, *Draft Final Technical Memorandum No 1, Volume II Pipelines, Addendum to Phase I RFI/RI Work Plan Rocky Flats Environmental Technology Site, Original Process waste Lines (Operable Unit No 9),* Golden, CO, November

DOE, 1995, *Draft Data Summary 2, Operable Unit 13, 100 Area*, Golden, CO, June

PAC REFERENCE NUMBER: 000-505

IHSS Number Not Applicable

Unit Name Storm Drains

Approximate Location RFP Main Production Facility

Date(s) of Operation or Occurrence

1952 –Present

Description of Operation or Occurrence

There are 239 storm drains at RFETS (Figure 2 1) The storm drains provide site drainage from roads, parking lots, and other areas and discharge into the creeks and drainage's north and south of the Site Footing Drains from site buildings also discharge to storm drains

Physical/Chemical Description of Constituents Released

The storm drains were designed to convey surface water away from the Site but unplanned accidental discharges to the system have occurred Several incidents have been reported and include the following

- Potential contamination at 771 Building storm drain,
- Wash water from the degreasing of depleted uranium parts near Building 991,
- Release of nitric acid/nitradd waste solution from Building 460,
- Release of miscellaneous materials into the storm drain west of Building 446, PAC 400-803 (DOE, 1992),
- PCB runoff from Building 707,
- PCB runoff from Building 444 Courtyard,
- Building 776 Storm Drain,

Various waste liquids from laundry and decontamination facilities, the analytical laboratory, radiography sinks, and runoff from the Building 771 roof and ground areas were discharged into the Building 771 storm drain from 1953 until mid 1957 Periodic releases from laundry holding tanks occurred until 1965 (Piltingsrud, 1971) Radionuclide concentrations in soils ranged from 130 to 2000 d/m/g and in sediments from 60,000 to 200,000 d/m/g (Abbott, 1971)

Cleaning operations were performed on depleted uranium parts in the open courtyard of Building 991 during the late 50's and early 60's Parts were degreased with acetone and other organic solvents Spills and water wash downs were flushed into the storm drains which discharged into South Walnut Creek (Illsley, 1986)

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In April 1989, between 5 and 7 gallons of nitric acid/nitradd waste solution from Building 460 entered a storm drain that feeds into Pond C-2

Miscellaneous materials including silver paint and possibly oil and aluminum paint were dumped into the storm drain immediately west of Building 446 (DOE, 1992)

The Building 371 storm drains and ditches were sampled in 1987 The results of sample analysis are listed in Table 2 3 It is not known if samples were collected during a storm event or from standing water

Table 2.3 Analytical Results from Building 371 Storm Drains and Ditches

	Analyte	Results
Storm Drains	Gross Alpha	24 +/- 8 pCi/L
	Gross Beta	64 +/- 4 pCi/L
	PH	6 8
	NO^-_3 as N	0 53 mg/L
Ditches (North)	Gross Alpha	18 +/- 16 pCi/L
	Gross Beta	14 +/- 34 pCi/L
	NO_3 as N	1 27 mg/L
Ditches (South)	Gross Alpha	19 +/- 13 pCi/L
	Gross Beta	16 +/- 35 pCi/L
	NO^-_3 as N	0 33 mg/L

Responses to Operation or Occurrence

In September 1970, two 55-gallon drums of contaminated soil were removed from the Building 771 storm drain area and additional soil was removed in February of 1971 At least 50 drums of contaminated soil were eventually removed Remaining soils were surveyed and results ranged from 120 to 3000 d/m/g (Piltingsrud, 1971)

The contractor was required to cleanup up the storm drain ditch west of Building 446 and disposition the waste No other documentation could be found detailing the responses to potential releases from this occurrence

Fate of Constituents Released to Environment

No documentation was found which detailed the fate of constituents from the above releases to the environment

Action/No Further Action Recommendation

This PAC will be studied in accordance with the 2006 Baseline in IA Group 000-3

Comments

None

References

Abbott, F E 1971, to Roser, H E USAEC, Subject "Contamination at the Outfall of Building 771 Storm Drain"

DOE, 1992, *Historical Release Report*, Rocky Flats Plant, Golden, CO, January

C W Piltingsrud, 1971 to L M Joshel, Subject "Contamination at the Outfall of Building 771 Storm Drain"

C T Illsley, 1986, to File, Subject Degreasing of depleted uranium parts near Building 991

PAC REFERENCE NUMBER: SE-1602

IHSS Number Not Applicable

Unit Name East Firing Range

Approximate Location N748,755, E2,087,041

Date(s) of Operation or Occurrence

1951 - 1986

Description of Operation or Occurrence

A firing range, located in the Southeastern Buffer Zone (see Plate 4) was used for target practice and security officer qualification from 1951 through 1986 From 1951 through 1981 the hillside east of the range was used, and after 1981, the hillside south of Woman Creek was used as target areas

North Target Area

The north target area consists of a firing range and berm (approximately 300 feet by 200 feet) Rounds were fired from the firing range east towards the berm Bullets have been found in the berm and may be present up to 20 feet back from the berm Ricocheting bullets may also be present west of the firing range Handgun and shotgun bullets of various caliber were used in this area (Richmond, 1999)

South Target Area

The south target area is located south of the firing range and on the hillside south of Woman Creek. Rounds were fired from the firing range south towards targets and into the hillside Target frames are still present in the target area Bullets have been found from the range to the road above the hillside and may also be present in the drainage Handgun, shotgun, and rifle bullets of various caliber (up to 50 caliber), as well as depleted uranium armor-piercing bullets were used in this area Depleted uranium armor-piercing bullets were not routinely used at the firing range (Richmond, 1999)

Physical/Chemical Description of Constituents Released

Lead from spent bullets is found in and near the Firing Range and north berm and southern hillside Depleted uranium may be present in the south hillside Lead and armor-piercing bullets may have penetrated the berm and hillside to 1½ feet

Responses to Operation or Occurrence

Brass bullet casings were collected, containerized, and sent to PU&D for disposition (Richmond, 1999)

No other documentation was found which detailed the responses to potential releases at the East Firing Range

Fate of Constituents Released to Environment

No documentation was found which detailed the fate of constituents released to the environment

Action/No Further Action Recommendation

Further investigation is recommended for this area

Comments

Lead is not present in surface water samples from Pond C-2 downstream from the firing range

The East Firing Range is located within the 903 Lip Area (IHSS 155), however, the target areas are not within IHSS 155

There is no radiological data at present from the target areas where suspected armor piercing (depleted uranium) ammunition was fired

References

Personnel communication Mr Lou C Richmond, WSLLC, September 13, 1999

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SECTION 3.0

REVISED PAC NARRATIVES

PAC REFERENCE NUMBER: NW-1501

IHSS Number	Southwest Corner of IHSS 170
Unit Name	Asbestos Insulated Boiler at the PU&D yard
Approximate Location	N 751,250, E 2,0813,390

Dates of Operation or Occurrence

An occurrence was reported on November 12, 1992

Description of Operation or Occurrence

On November 12, 1992 it was discovered that a reportable quantity of asbestos (approximately 1-1/2 pounds) was potentially released to the environment from a boiler wrapped with deteriorating asbestos insulation The boiler was being stored in the southwest corner of the "old" PU&D yard (IHSS 170) (EG&G, 1993)

Physical/Chemical Description of Constituents Released

The location of a potential release was identified as being within the IHSS 170 boundary (DOE, 1992) and the Reportable Quantity (RQ) established for asbestos was estimated to be more than one pound Sampling results of the insulation material (collected in 1992) identified the source material as 60% chrysotile asbestos (based on the total volume of sample analyzed) Chrysotile asbestos was identified as the Potential Contaminant of Concern (PCOC) Visual observations made on November 12, 1992 indicate that approximately 15 square feet of asbestos-containing insulation was missing There was no visible insulation material identified on the ground

Responses to Operation or Occurrence

The National Response Center (NRC) was notified immediately upon discovery of the boiler and subsequent missing asbestos Containment operations began immediately by wetting down the boiler and surrounding ground and covering the area with plastic The boiler was wrapped with plastic, taped, and removed

A Sampling and Analysis Plan (SAP) for characterization sampling was prepared by a State Certified Asbestos Inspector (RMRS, 1999a) which followed the required methodology for sampling and complied with plant procedures Using the methodologies and applicable regulations specified in the SAP, ten composite surface soil samples (nine real and one duplicate) were collected on January 24, 1999 to determine if soils in the vicinity were contaminated with chrysotile asbestos (Figure 3 1)

The samples were submitted to a laboratory accredited through the National Institute of Standards and Technology and analyzed by Polarized Light Microscopy in compliance with guidelines established by the EPA 40 CFR 763 86, Appendix A, Subpart F (EPA, 1987) None of the soil samples contained detectable levels of chrysotile asbestos Laboratory results are summarized in Table 3 1

Table 3.1 1999 Asbestos Results (by Polarized Light Microscopy)

Sample Number	Sample Description and Location	Lab Result Tremolite	Lab Result Chrysotile
990128-MS-123-1	1" soil sample, from super-grid 1, sub-grids 1,2, & 3 Used Random Number Diagram #9	TR (< 25%)	ND (<1%)
990128-MS-123-2	1" soil sample, from super-grid 1, sub-grids 1,2, & 3 Used Random Number Diagram #1	ND	ND (<1%)
990128-MS-123-3	1" soil sample, from super-grid 1, sub-grids 1,2, & 3 Used Random Number Diagram #2	ND	ND (<1%)
990128-MS-123-4	1" soil sample, from super-grid 1, sub-grids 1,2, & 3 Used Random Number Diagram #3	ND	ND (<1%)
990128-MS-123-5	1" soil sample, from super-grid 1, sub-grids 1,2, & 3 Used Random Number Diagram #4	ND	ND (<1%)
990128-MS-123-6	1" soil sample, from super-grid 1, sub-grids 1,2, & 3 Used Random Number Diagram #5	ND	ND (<1%)
990128-MS-123-7	1" soil sample, from super-grid 1, sub-grids 1,2, & 3 Used Random Number Diagram #11	TR (< 25%)	ND (<1%)
990128-MS-123-8	1" soil sample, from super-grid 1, sub-grids 1,2, & 3 Used Random Number Diagram #17	ND	ND (<1%)
990128-MS-123-9	1" soil sample, from super-grid 1, sub-grids 1,2, & 3 Used Random Number Diagram #7	ND	ND (<1%)
990128-MS-123-10 (QC)	1" soil sample, from super-grid 1, sub-grids 1,2, & 3 Used Random Number Diagram #7	ND	ND (<1%)

ND indicates Non-Detected, TR indicates Trace Detection < 25% for Tremolite

Fate of Constituents Released to the Environment

An unknown amount of chrysotile asbestos was potentially released to the environment However, as the above data suggests, no detectable levels of the contaminant could be found within the sampling area or vicinity of the potential release It is suspected that the boiler may have been placed in the storage yard with the asbestos material already missing and that a release did not occur at this location

Action/No Further Action Recommendation

An asbestos source evaluation was performed for PAC NW-1501 per RFCA (DOE, 1996) Based on the results of the soil samples collected, no current or potential contaminant source was identified The containment and removal of the asbestos-containing boiler in 1992 and the results of the recent source evaluation provide sufficient justification to determine that there is no current or potential threat to public health or the environment According to RFCA (DOE, 1996), if a previous removal action has removed a contaminant source (the removal and disposal of the asbestos-containing boiler), then an NFA justification shall be prepared and the HRR updated Based upon the characterization efforts presented in this narrative and referenced in the

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No Further Action Justification Document for the Property Utilization and Disposal Yard Asbestos Site (RF/RMRS 99-331 UN (RMRS, 1999b), PAC NW-1501 is proposed for NFA

Comments

Tremolite asbestos occurs naturally in metamorphic deposits along the Front Range and is commonly identified in trace concentrations (< 25%)

Based upon Operable Unit 10 field sampling results (EG&G, 1995), the Data Summary Report for the Characterization of the PU&D yard (RMRS, 1997), and the No Further Action Justification Document for the Property Utilization and Disposal (PU&D) Yard (IHSS 170, IHSS 174A, and IHSS 174B) (RMRS, 1999c), there are no other Potential Contaminants of Concern (PCOCs) from other releases or activities in PAC NW-1501

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1996, *Final Rocky Flats Cleanup Agreement,* Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

EG&G, 1993, *Third Quarterly Report to the Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, April

EG&G 1995, *Draft Technical Memorandum 1, OU 10, Other Outside Closures*, Rocky Flats Environmental Technology Site, Golden, CO, January

EPA, 1987, 40 CFR 763 86, Appendix A, Subpart F, Federal Register, Vol 52, No 210, Rules and Regulations, October 30

RMRS, 1997, *Data Summary Report for IHSSs 170, 174A, and 174B, Property Utilization and Storage Yard*, RF/RMRS-097-080 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

RMRS, 1999a, *Asbestos Sampling and Analysis Plan for the Property Utilization and Disposal Yard Boiler Site,* RF/RMRS 99-300, Rocky Flats Environmental Technology Site, Golden, CO, January

RMRS, 1999b, *No Further Action Justification Document for the Property Utilization and Disposal Yard Asbestos Site,* RF/RMRS 99-331 UN, Rocky Flats Environmental Technology Site, Golden, CO, March

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RMRS, 1999c, *Draft No Further Action Justification Document for the Property Utilization and Disposal (PU&D) Storage Yard (IHSS 170, IHSS 174A, and IHSS 174B,* Rocky Flats Environmental Technology Site, Golden, CO, June

PAC REFERENCE NUMBER: NE-1408

IHSS Number — Not Applicable

Unit Name — OU 2 Test Well, Current Well Number 21993

Approximate Location — N750,000, E2,087,314

Date(s) of Operation or Occurrence

April 26, 1993

Description of Operation or Occurrence

Approximately 10 gallons of groundwater was spilled when a casing being inserted into a new bedrock monitoring well (Well Number 21993) forced the water out of the hole and onto the ground An approximate 2 foot by 8 foot area was wetted in the incident (EG&G, 1993)

Physical/Chemical Description of Constituents Released

Analytical testing of a well 20 feet upgradient (Well 3687) identified the following F001 contaminants in the groundwater carbon tetrachloride, trichloroethene and tetrachloroethene Chloroform and 1,1-dichloroethene were also identified (EG&G, 1993) Table 3 2 presents the analytical results as presented in EG&G, 1993

Table 3.2. Volatile Organic Compounds Detected in Well 3687 from March 1991 to May 1992.

Analyte	Highest/Average Value Detected (mg/L)	Regulatory Limit (mg/L)
Trichloroethene	96 0/50 8	0 50
Carbon tetrachloride	0 870/0 58	0 50
Tetrachloroethene	1 10/0 510	0 70
1,1-Dichloroethene	1 044/N/A	0 70
Chloroform	1 10/0 540	6 00

Responses to Operation or Occurrence

A desiccant was immediately applied to the area to absorb the water and prevent it from spreading The wet desiccant, wet dirt from below the desiccant, and a layer of underlying dry dirt were

removed from the area, containerized, and dispositioned in accordance with plant procedures (DOE, 1993)

Fate of Constituents Released to Environment

The soil wetted by the spill was cleaned up (until dry soil was encountered) and placed into barrels with "Aqua-Set" absorbent Approximately 11 cubic feet (1-1/2 drums) of material were removed from the location (EG&G, 1993)

At the time of the incident, cleanup verification was determined visually and samples were not collected Sampling to support characterization of PAC NE-1408 for possible designation as NFA was conducted per the Agency approved SAP for Characterization of Potential No Further Action Sites (RMRS, 1999a) Two surface soil samples were collected and analyzed for Volatile Organic Compounds (VOCs) to verify the adequacy of the previous response action (Figure 3 2) The sample depth was just below the surface from a four-inch depth to a six-inch depth As summarized in Table 3 3, VOCs were not detected in the samples collected A correlation table (Table 3 4) is provided for future reference to match the RIN#, the site location, Borehole ID, event, depth and analysis performed All of the analytical results are presented in the Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) for PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313(RMRS, 1999b)

Table 3.3 Summary of Results for PAC NE-1408.

Potential Contaminants of Concern[1]	Number of Surface Soil Samples	Number of Detects > RFCA Tier II [2]	Comparison Values (mg/Kg)		Range of Values Detected (mg/Kg)	
			RFCA Tier II[3,4]	RFCA Tier I [5,6]		
Volatile Organic Compounds						
None detected	2	0	NA	NA	NA	NA

1 Contaminants of concern are those chemicals detected above background concentrations presented in the Geochemical Characterization of Background Surface Soils' Background Soils Characterization Program (DOE, 1995)

2 *PAC NE-1408 is within the Buffer Zone OU Open Space RFCA Action Levels apply*

3 Tier II values for non-radionuclides represent either 1E+06 carcinogenic risk to an open space user (or appropriate receptor) or a hazard index of 1 for non-carcinogenic toxicity

4 Tier II values for radionuclides are based on an annual dose limit of 15 mrem to a hypothetical resident.

5 Tier I values for non-radionuclides represent either 1E+04 carcinogenic risk to an open space user (or appropriate receptor) or a hazard index of 1 for non-carcinogenic toxicity

6 Tier I values for radionuclides are based on an annual dose limit of 15 mrem to an office worker

Table 3.4 Correlation Table for Characterization Samples at PAC NE-1408

RIN No	PAC	Borehole ID	Event No	Bottle No	Actual Sample Interval (Inches BGS)	Analysis	Comments
99A7632	NE-1408	#1	001	001	0-6	VOC	Soil
		#2	002	001	0-5	VOC	Soils

Action/No Further Action Recommendation

Based on the results of the soil samples collected, no current or potential contaminant source was identified PCOCs for PAC NE-1408 were not detected and therefore this PAC is recommended for No Further Action consistent with criteria set forth in the Rocky Flats Cleanup Agreement (RFCA), (DOE, 1996)

Comments

None

References

DOE, 1996, *Final Rocky Flats Cleanup Agreement,* Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

EG&G, 1993, *Historical Release Report Fourth Quarterly Update, April 1, 1993 to July 1, 1993*

RMRS, 1999a, *Sampling and Analysis Plan for Characterization of Potential No Further Action Sites*, RF/RMRS-99-339, Rocky Flats Environmental Technology Site, Golden, CO, June

RMRS, 1999b, *Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313,* Rocky Flats Environmental Technology Site, Golden, CO, July

PAC REFERENCE NUMBER: NE-1409

IHSS Number	Not Applicable
Unit Name	Interceptor Trench Pump House
Approximate Location	N751,647, E2,085,277

Date(s) of Operation or Occurrence

The incident occurred on July 20, 1993, sometime after a 10 30 a m inspection of the subject system and before 1 00 p m when Building 910 operators first noticed signs of the occurrence (DOE, 1994)

Description of Operation or Occurrence

An occurrence related to the pumping operation of wastewaters collected by the Solar Evaporation Ponds Interceptor Trench System (ITS) and subsequent transfer to the Modular Storage Tanks (MSTs) occurred on July 20, 1993 Approximately 4,700 gallons of RCRA F-listed water in the primary containment piping (located between the MSTs and the ITS sump) began leaking into the secondary containment The water overflowed back into the modular tank pump house due to system design, however, was fully contained in the pump house secondary containment When the liquid level in the pump house secondary containment rose, the local alarm was activated and the pumps automatically shut down This alerted the Building 910 operators to the occurrence When the building operators found that liquid was still siphoning out through the pump, they closed the manual valves (DOE, 1994)

Some of the water gravity-drained through a failed hose connection on the secondary containment piping located within the ITS sump The ITS sump is equipped with an automatic level control which pumped the liquid back into the MSTs (DOE, 1994)

Physical/Chemical Description of Constituents Released

The released material was considered RCRA F-listed hazardous waste based on 6 CCR 1007-3 because it passed through the ITS sump (which is considered a waste generation point) Applicable EPA waste codes for the released material include F001, F002, F003, F005, F006, F007 and F009 Table 3 5 provides a summary of the RCRA constituents historically present in the ITS water and an estimate of the amount potentially released based on the volume (DOE, 1994)

Table 3.5 Summary Statistics for Station SW095, 1991-1992 (DOE, 1994)

Potential Constituent Of Concern	Number of Samples	Number of Detects	Mean (mg/L)	Regulatory Limit (mg/L)	Estimated Amount Released (lb)
Total Metals[1]					
Cadmium	24	0	00184[2]	1 0[2]	0 000074
Chromium	26	8	00984	5 0[2]	0 000394
Lead	28	2	00123	5 0[2]	0 000049
Silver	22	2	00393	5 0[2]	0 000157
Volatile Organic Compounds					
Methylene Chloride	25	0	00230[3]	0 44[4]	0 000092
Carbon Tetrachloride	25	1	00258	0 057[4]	0 000103
Chloroform	25	0	00192[3]	0 046[4]	0 000076
Tetrachloroethene	25	0	00250[3]	0 056[4]	0 000100
Toluene	25	0	00250[3]	0 080[4]	0 000100
Trichloroethene	25	2	00302	0 054[4]	0 000121
Plating Substances					
Cyanide	25	1	01000	1 2-1,9[4]	0 000400
Nickel	25	2	01042	0 040[4]	0 000417

[1]Concentration of metals below characteristic regulatory limit therefore, water is not regulated characteristic waste
[2]TCLP maximum concentration of contaminants for toxicity characteristic
[3]Mean calculated using half the detection limit for concentrations at the detection limit.
[4]Land Disposal Restricted Constituent Concentration treatment standard levels in wastewater (reference §268 43)

Responses to Operation or Occurrence

The water that overflowed into the modular tank pump house was pumped into a portable tank and trucked to Building 374 for treatment The wipes used in the final cleanup of the pump house were designated hazardous waste and were placed into drums for storage in a RCRA satellite accumulation area (DOE, 1994)

Various actions were performed to operate the system in accordance with RCRA requirements As summarized in DOE, 1994, these actions included

1 Repair the primary transfer pipeline

2 Modify the secondary containment portion of the line within the ITS sump to prevent leakage of water back into the sump Although the portion of the line can be visually inspected, it is preferable to modify the secondary containment in this manner

3 Retest the line following repair

4 Complete or repair the installation of leak-detectors in the secondary containment portion of the line that were not operational at the time of the incident

5 Confirm that the process control logic supports positive shut-down of the pumps when a leak is detected in the secondary containment system in the ITS sump

6 Repair the remote alarm which was not operable when the liquid (waste) was released into the pump house

7 Analyze pressure conditions in the Building 910 feed system to determine if components experienced an over-pressurization(repair as needed)

8 Incorporate pressure-surge control as needed to ensure "hammer-free" operation when the liquid discharge is intermittently secured by automatically operating feed valves in Building 910

Fate of Constituents Released to Environment

No release to the environment is known to have occurred from this incident, however, because the concrete sump that received the waste is unlined, the RCRA contingency plan was implemented as a precautionary measure (DOE, 1994) Additionally, PAC NE-1409 had not been subject to further investigation until construction activities related to the MST Freeze Protection project were initiated in November 1998 Four soil samples were collected in December 1998 and January 1999 in support of the Site Survey Determination for Environmental and Worker Exposure, the supporting Soil Disturbance Evaluation and hazardous waste determination requirements The sample locations (Figure 3 3) were placed at each corner of the ITS sump and selected based on professional judgement (i e , if a release actually had occurred from the sump the soil surrounding the sump would likely be contaminated) Based on the characteristics of the waste that accumulated in the sump, the soil samples were analyzed for metals and VOCs Analysis for cyanide was not performed because the waste concentrations (Table 3 5) are below background concentrations Additionally, because groundwater in the surrounding area is contaminated with nitrate and uranium, samples were also analyzed for nitrate and isotopic radionuclides Sampling for Semivolatile Organic Compounds (SVOCs) was requested by the qualified hazardous waste generator and performed at two of the locations

A correlation table (Table 3 6) is provided for future reference to match the RIN#, the site location, Borehole ID, event, depth and analysis performed Sample ID numbers 1,2,3,4, shown on Table 3 6 correspond to the southeast, northwest, northeast and southwest corners of PAC NE-1409 respectively Results of the analyses are summarized in Table 3 7 along with the appropriate RFCA action level All of the analytical results are presented in the Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) for PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313(RMRS, 1999)

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Table 3.6 Correlation Table for Characterization Samples at PAC NE-1409

RIN No	PAC	Sample ID	Event No	Bottle No	Actual Sample Interval (Inches BGS)	Analysis	Comments
99A4136	NE-1409	#1	001	003	0-8	VOAs	Soil
		#1 REPREP	001	003	0-8	VOAs	Soils
		#2	002	003	0-8	VOAs	Soils
		#2 REPREP	002	003	0-8	VOAs	Soils
		#3	003	003	0-8	VOAs	Soils
		#3 REPREP	003	003	0-8	VOAs	Soils
		#4	004	003	0-8	VOAs	Soils
		#4 REPREP	004	003	0-8	VOAs	Soils
		#1	001	004	0-8	Metals	Soils
		#2	002	004	0-8	Metals	Soils
		#3	003	004	0-8	Metals	Soils
		#4	004	004	0-8	Metals	Soils
		#1	001	002	0-8	Isotopics	Soils
		#2	002	002	0-8	Isotopics	Soils
		#3	003	002	0-8	Isotopics	Soils
		#4	004	002	0-8	Isotopics	Soils
		#1	001	005	0-8	Nitrates	Soils
		#2	002	005	0-8	Nitrates	Soils
		#3	003	005	0-8	Nitrates	Soils
		#4	004	005	0-8	Nitrates	Soils
		#1	001	006	0-8	SVOAs	Soils
		#2	002	006	0-8	SVOAs	Soils

Table 3.7 Summary of Results for PAC NE-1409

Potential Contaminants of Concern[1]	Number of Surface Soil Samples	Number of Detects > RFCA Tier II [2]	Comparison Values (mg/Kg or pCi/g)		Range of Values Detected (mg/Kg or pCi/g)	
			RFCA Tier II [3,4]	RFCA Tier I [5,6]		
Volatile Organic Compounds						
Acetone	4	0	1 92E+05	1 92E+05	0 019	0 028
Methylene Chloride	4	0	2 39E+05	5 98E+02	0 008	0 011
Total Metals						
Molybdenum	4	0	9 61E+03	9 61E+03	0 26	0 46
Thallium	4	1	–[7]	–[7]	0 67[7]	1 2[7]
Radionuclides						
Plutonium-239/241	4	0	252	1429	0 092	0 142
Uranium-235	4	0	24	135	Not detected	0 081
Nitrate						
Nitrate	4	0	>1E+06	>1E+06	2 1	31 8

1 Contaminants of concern are those chemicals detected above background concentrations presented in the Geochemical Characterization of Background Surface Soils Background Soils Characterization Program (DOE, 1995)

2 PAC NE-1409 is within the Industrial Area OU, Industrial Use RFCA Action Levels apply
3 Tier II values for non-radionuclides represent either 1E+06 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity
4 Tier II values for radionuclides are based on an annual dose limit of 15 mrem to a hypothetical resident
5 Tier I values for non-radionuclides represent either 1E+04 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity
6 Tier I values for radionuclides are based on an annual dose limit of 15 mrem to an office worker
7 RFCA action levels do not exist for thallium because of a lack of toxicity information The value is in excess of RFETS background concentrations but within the background range 0 8 to 1 2 mg/Kg

Action/No Further Action Recommendation

Based on the results of the soil samples collected, no current or potential contaminant source was identified PCOCs for PAC NE-1409 were not detected and therefore this PAC is recommended for NFA consistent with criteria set forth in the Rocky Flats Cleanup Agreement (RFCA), (DOE, 1996)

Comments

None

References

DOE, 1994, *Historical Release Report, Seventh Quarterly Update, January 1, 1994 to March 31, 1994,* Rocky Flats Environmental Technology Site, Golden, CO

DOE, 1996, *Final Rocky Flats Cleanup Agreement,* Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

RMRS, 1999, *Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313,* Rocky Flats Environmental Technology Site, Golden, CO, July

PAC REFERENCE NUMBER. NW-170

IHSS Reference Number	170, Buffer Zone Operable Unit
Unit Name	PU&D Storage Yard
Approximate Location	N751,500, E2,082,000

Date(s) of Operation or Occurrence

1974 – 1994

Description of Operation or Occurrence

Historically, the Property Utilization and Disposal (PU&D) storage yard was used for storing empty drums and dumpsters, cargo boxes, cable spools, and similar materials The yard was divided in thirds with wire fences The eastern third was used for storage of scrap metal and encompassed the drum (PAC-NW-174A) and dumpster (PAC-NW-174B) storage areas The center third was used for the storage of equipment such as stainless steel tanks The western third was used for the storage of excess property The greatest potential for contamination was considered the eastern third because scrap metal may have been stored without prior decontamination and hazardous materials in drums and dumpsters were transferred in this area of the yard (DOE, 1992)

An incident involving a radioactively contaminated drum in the yard occurred in December 1987 An unknown powder spilled out of a drum while the drum, which had no bung and was believed to be empty, was being rolled over to a truck for off-Site recycling (DOE, 1992) Approximately 95 percent of the spilled powder was recovered with the affected soil and analyzed as a soil sample The drum was found to contain a small amount of radioactive powder This powder was not detected by exterior radiation monitoring, however results of a sample of the pure powder indicated 3,000 picocuries per gram (pCi/g) plutonium, 1,000 pCi/g americium, and 100 pCi/g uranium-235 The powder was composed of 60 percent aluminum oxide and 32 5 percent chromium oxide (Rockwell, 1987, DOE, 1992) This incident probably occurred in IHSS 174A, PU&D Drum Storage Facility (PAC-NW-174A)

An incident occurred in October 1990 involving drums stored in the yard Approximately 100 empty drums were stored in the yard with the bungs unsecured Rainwater that had entered the drums became contaminated with residual hazardous materials previously contained in the drums The rainwater was not radioactively contaminated (DOE, 1992) This incident probably occurred in IHSS 174A, PU&D Drum Storage Facility (PAC-NW-174A)

Detonation of unstable reactive chemicals was conducted on three occasions at the PU&D Yard on December 28, 1996, November 1, 1997, and November 27, 1997 The types of chemicals regarded as unstable (benzoyl peroxide, 1-methyl 3-nitro1-nitrosoguanidine,anhydrous ethyl ether, methyl ethyl ketone, ammonium perchlorate, kerosene, BZ alloy, red phosphorous) were permitted for disposal using

detonation methods by the CDPHE and EPA Air sampling and radiological surveys were conducted prior to and after each event and there were no reported releases associated with the operations (DOE, 1997)

Physical/Chemical Description of Constituents Released

A powder composed primarily of aluminum and chromium oxides, contaminated with plutonium, americium, and uranium, was spilled Other releases may have occurred from leaking batteries, drums, and scrap metal stored without prior decontamination Hazardous materials in drums and dumpsters were transferred in this area of the yard and may have resulted in release(s) (DOE, 1992)

Responses to Operation or Occurrence

An internal investigation report was generated after the unknown powder incident PU&D, Waste Operations, and Waste Guidance groups were involved with the cleanup operations resulting from the rainwater in the drums The rainwater in the drums was disposed in accordance with Site waste procedures The drum bungs were tightened to prevent potential re-occurrence and drum decontamination procedures were implemented (DOE, 1992)

Assessment of environmental contamination attributable to PU&D yard operations was initiated as part of the OU 10 Phase I RFI/RI (EG&G, 1995) and a pre-remedial investigation was conducted to assess VOCs in the subsurface soil (RMRS, 1997)

Fate of Constituents Released to Environment

In 1993, 37 surface soil samples taken from IHSS 170 were analyzed for total metals, SVOCs, pesticides, and polychlorinated biphenyl's (PCBs) No results were above current or proposed RFCA Attachment 5, Action Levels and Standards Framework (ALF) Tier II surface soil action levels (DOE, 1996)

Forty-six locations within and adjacent to IHSS 170, 174A, and 174B were surveyed with a High Purity Germanium (HPG) detector and no anomalous radionuclide activities were observed IHSS 170 overlaps with IHSS 174A and IHSS 174B

A summary of surface soil detects for IHSS 170 is given in Table 3 8

In 1994, approximately 235 soil gas locations were sampled within and adjacent to IHSS 170, 174A, and 174B for VOC analysis The data presented in EG&G 1995, indicated that VOCs were potentially present in subsurface soils along the eastern third of the yard

A pre-remedial investigation of IHSSs 170, 174A and 174B was performed in August 1997 (RMRS, 1997a) Characterization of the PU&D Yard was conducted to investigate the potential presence of a VOC contaminant source The investigation consisted of 20 soil borings and 38 subsurface soil samples over IHSSs 170, 174A and 174B, which were analyzed for VOCs In most cases, the borehole locations corresponded with areas where VOC detections in soil gas samples were observed in the 1994 survey

Table 3.8 Summary of Surface Soil Analyses in IHSS 170 (EG&G, 1995) and Comparison of Detects to RFCA Tier I and Tier II Open Space Levels

Contaminants of Concern	Location	Number of Surface Soil Samples	Number of Detects Above Proposed RFCA Tier II Open Space Level	Comparison Value (mg/kg)				Range of Values for Detects Above Proposed RFCA Tier II Open Space Level (mg/kg)	
				Proposed RFCA Tier II Open Space	Proposed RFCA Tier II Open Space	Current RFCA Tier I Open Space	Current RFCA Tier II Open Space		
Total metals	IHSS 170	37	0			Various	Various	N/A	
Semivolatile organic compounds	IHSS 170	37	0			Various	Various	N/A	
Pesticides	IHSS 170	37	0			Various	Various	N/A	
PCBs	IHSS 170	37	0					N/A	
Radionuclides (by HPGe)	IHSS 170, 174A, and 174B	46	0			Various	Various	N/A	

Table 3.9 VOC Analytical Results for IHSS 170 Subsurface Soil (RMRS, 1997b) in Micrograms Per Kilogram (µg/Kg)

Borehole No	Sample Depth (ft)	Methylene Chloride (µg/Kg)	[illegible]	[illegible] (Current RBCA)	Napthalene (µg/Kg)	[illegible]
17797	4 4-4 9	2,100B		[illegible]	<630 (ND)	
17897	5 4-5 9	<630 (ND)		[illegible]	390J	
18097	5 0-5 5	440JB		[illegible]	<630 (ND)	
18197	5 0-5 5	2,600B		[illegible]	<630 (ND)	
18297	5 0-5 5	400JB		[illegible]	<630 (ND)	
18397(A)	5 0-5 5	400JB		[illegible]	<630 (ND)	
18497(A)	5 0-5 5	410JB		[illegible]	<630 (ND)	
18597(A)	5 0-5 5	370JB		[illegible]	<630 (ND)	
18697(A)	5 0-5 5	400JB		[illegible]	<630 (ND)	

DUP = Duplicate sample
A = Borehole location immediately adjacent (downgradient) to the IHSS
ND = Not detected
J = Estimated concentration of analyte detected below the method practical quantitation limit
B = Analyte detected in the method blank

(EG&G, 1995, RMRS, 1997b) As a result, borehole locations within IHSS 170 were concentrated in the eastern third of the IHSS (Figure 3 4) Additionally, two boreholes were placed in areas of visibly stained soil Table 3 9 summarizes the analytical results for soil borings associated with IHSS 170 (RMRS, 1997b) No VOC contaminants of concern (tetrachloroethene, trichloroethene, and 1,1,1-tetrachloroethane) were detected in subsurface soil samples from IHSS 170 (RMRS, 1997b) As indicated in Table 3 9, methylene chloride (a common laboratory contaminant) was detected in most of the subsurface soil samples, however, the contaminant was also detected in the method blank associated with the analyses As a result, the identification of methylene chloride in the samples is most likely attributable to laboratory contamination

Napthalene was estimated in one sample from borehole 17897 at 390 µg/Kg, substantially below the current RFCA Tier I (5,770,000 µg/Kg) and proposed RFCA Tier I and Tier II (10,100,000 and 101,000 µg/Kg, respectively) subsurface soil action levels (RMRS, 1997b)

Each soil boring had a pre-work 17-point survey performed with a Field Instrument for the Detection of Low-Energy Radiation (FIDLER) Based on the survey results, the three highest FIDLER measurements were selected for surface soil samples and analyzed for isotopic radionuclides The isotopic results were below background levels (RMRS, 1997b)

Six groundwater samples were collected during the pre-remedial investigation of IHSSs 170, 174A and 174B Three of the six samples were within the IHSS 170 boundary Table 3 10 summarizes the analytical results for these three samples (RMRS, 1997b)

The PCE concentration of 15 µg/L detected in groundwater, from borehole 18197, is above the current and proposed RFCA Attachment 5, ALF Tier II Groundwater Action Level of 5 µg/L Trichlorotrifluoroethane was also detected in groundwater from IHSS 170 that also may indicate impact from past practices (i e , freon-based lathe coolant) However, a RFCA action level or Programmatic Preliminary Remediation Goal (PPRG) for the compound has not been calculated The 1,1,1-TCA was below the current and proposed RFCA Attachment 5, ALF Tier II groundwater action level of 200 µg/L

Analytical data from the pre-remedial investigation were evaluated for data usability and assessed in terms of the five data quality parameters precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters The data is considered sufficient to meet the PARCC parameters and meets the projects' data quality objectives to characterize subsurface VOC contamination in IHSS 170 (RMRS, 1997b)

Based on the analytical results from the pre-remedial investigation, a VOC contaminant source was not identified Additionally, concentrations of VOCs equal to or above RFCA Attachment 5, ALF Tier I Subsurface Soil Action Levels were not identified in the area of IHSS 170 (see Table 3 9) (RMRS, 1997b) RFCA Attachment 5, ALF Tier I Subsurface Soil Action Levels for organic contaminants are based on leachability to groundwater at Tier I groundwater action levels PCE

Table 3.10 VOC Analytical Results for IHSS 170 Groundwater (RMRS, 1997) in µg/L

Borehole No	Sample Depth (ft)	PCE (µg/L)	[illegible]	1,1,1-TCA (µg/L)	[illegible]	Trichloro-trifluoroethane (µg/L)*
			[illegible]		[illegible]	*No existing RFCA action level or PPRG
17897	7 33	<5 (ND)	[illegible]	<5 (ND)	[illegible]	3 5J
18097	7 2	<5 (ND)	[illegible]	<5 (ND)	[illegible]	<5 (ND)
18197	8 9	15	[illegible]	6 3	[illegible]	<5 (ND)

NA = Not Applicable
ND = Not detected
J = Estimated concentration of analyte detected below the method practical quantitation limit
B = Analyte detected in the method blank

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detected in groundwater (see Table 3 10) indicates that the area was likely affected by previous drum storage and handling operations in IHSS 174A (PAC-NW-174A) However, PCE was not detected in the soil samples from boreholes placed in IHSS 170 indicating a residual source in excess of action levels does not remain

Action/No Further Action Recommendation for IHSS 170

No surface soil analyses demonstrated the presence of contaminants above proposed RFCA Attachment 5, ALF Tier II Surface Soil Action Levels in IHSS 170 Additionally, based upon surface and subsurface soil analytical data collected during the pre-remedial investigation, no existing or potential source of contamination associated with IHSS 170 could be identified

Furthermore, concentrations of VOCs equal to or above the current or proposed RFCA Attachment 5, ALF Tier I Subsurface Soil Action Levels were not identified in the area of IHSS 170 (see Table 3 9) (RMRS, 1997b) RFCA Attachment 5, ALF Tier I Subsurface Soil Action Levels for VOC contaminants are based on leachability to groundwater at Tier I groundwater action levels IHSS 170 poses no threat to either surface water or ground water, and therefore, is proposed for NFA The recommendation for NFA is consistent with the criteria for recommending NFA decisions presented in RFCA

Groundwater at IHSS 170 containing PCE concentrations above the RFCA Tier II groundwater action level is not considered in the Action/NFA recommendation because groundwater contamination at RFETS is addressed per RFCA by the Integrated Water Management Plan (KH, 1996) A plume of VOC contamination, which encompasses IHSS 170, has been delineated The plume is monitored by the RFCA groundwater monitoring program at the perimeter Monitoring indicates that there are no known or potential surface water impacts Details on the groundwater monitoring program are reported in the Annual RFCA Groundwater Monitoring Report(s) (RMRS, 1998)

Comments

IHSS 170 overlaps with PAC-NW-174A (IHSS 174A), PAC-NW-174B (IHSS 174B), PAC-NW-1500, and PAC-NW-1501

Per the CDPHE letter of July 9, 1999, the Data Summary Report (RMRS, 1997b) and the Rockwell Internal Letter (Rockwell, 1987) are submitted under a separate transmittal

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Rockwell, 1987, Internal Letter to File from F J Blaha, Subject Empty Drum Recycling Incident of 12/4/87, December 17

PAC REFERENCE NUMBER: NW-174A & NW-174B

IHSS Reference Number: 174, Buffer Zone Operable Unit

Unit Name: PU&D Drum Storage Facility (NW-174A)
PU&D Dumpster Storage Facilities (NW-174B)

Approximate Location: N752,000, E2,082,000

Date(s) of Operation or Occurrence

1974 – 1994

Description of Operation or Occurrence

Two areas within the PU&D storage yard (PAC NW-170) were specified for container storage One area stored drums (PAC NW-174A) and the other was designated for a dumpster (PAC NW-174B) Until August 1985, the drum storage area was used for the storage of RCRA-regulated waste (DOE, 1992) Subsequent to this, the area was used for the storage of empty drums (RMRS, 1997a) All drums were externally monitored for radiation prior to shipment to the PU&D yard The contents of drums originating from areas that handled radioactive materials were sampled and analyzed prior to shipment to the PU&D yard At times, the level of radioactivity set for acceptance in the yard was exceeded and drums were returned to their building of origin Dumpsters were also located at buildings and moved to the storage area when filled The dumpsters and drums were stored directly on the ground surface Material was stored in these areas prior to shipment for off-Site recycling (DOE, 1992) Storage in these areas stopped in 1994 and all containers were removed (RMRS, 1997a)

An incident in May 1982 identified two drums of liquid stored in the PU&D storage area as being pressurized with bulging drum heads A third drum was noted to have exploded with the bottom blown out No documentation was found which indicated a release to the environment as a result of these damaged drums No other documentation was found describing other releases to the environment (DOE, 1992)

An incident involving a radioactively contaminated drum in the yard occurred in December 1987 An unknown powder spilled out of a drum while the drum, which had no bung and was believed to be empty, was being rolled over to a truck for off-Site recycling (DOE, 1992) Approximately 95 percent of the spilled powder was recovered with the affected soil and analyzed as a soil sample The drum was found to contain a small amount of radioactive powder This powder was not detected by exterior radiation monitoring, however results of a sample of the pure powder indicated 3,000 pCi/g plutonium-239/240, 1,000 pCi/g americium-241, and 100 pCi/g uranium-235 The powder was composed of 60 percent aluminum oxide and 32 5 percent chromium oxide (Rockwell, 1987, DOE, 1992) This incident probably occurred in IHSS 174A, PU&D Drum Storage Facility (PAC-NW-174A)

An incident occurred in October 1990 involving drums stored in the yard Approximately 100 empty drums were stored in the yard with the bungs unsecured Rainwater that had entered the drums became contaminated with residual hazardous materials previously contained in the drums The rainwater was not radioactively contaminated (DOE, 1992) This incident probably occurred in IHSS 174A, PU&D Drum Storage Facility (PAC-NW-174A)

Physical/Chemical Description of Constituents Released

An internal investigation report was generated after the unknown powder incident PU&D, Waste Operations, and Waste Guidance groups were involved with the cleanup operations resulting from the rainwater in the drums The rainwater in the drums was disposed in accordance with Site waste procedures The drum bungs were tightened to prevent potential re-occurrence and drum decontamination procedures were implemented (DOE, 1992)

The drums held waste oils which contained hazardous constituents, waste paints, and spent paint thinner Waste oils were typically derived from equipment and vehicle maintenance activities The dumpster storage area was for the storage of stainless steel chips coated with freon-based or oil-based lathe coolant (DOE, 1992)

The dumpster contained stainless steel chips coated with lathe coolant The lathe coolant was either freon-based or oil-based Radioactive contamination of the chips was not expected due to the presence of administrative controls to prevent radioactively contaminated material from being shipped to the yard (DOE, 1992)

Visible staining is apparent on the soil in the dumpster storage area from spills which occurred during transfer and from rainwater washing residual oil from metal shavings onto the ground (DOE, 1992)

Responses to Operation or Occurrence

Visual monitoring of the drum and dumpster storage areas was conducted periodically Although visible staining on the ground surface was documented in the drum storage area, no documentation of leaks or spills was found (DOE, 1992)

The drums involved in the May 1982 incident were subsequently removed to the hazardous waste storage area (PAC NW-203) west of the Present Landfill and the contents identified It is presumed that the drums were located in the drum storage area of the PU&D storage facility (DOE, 1992)

Assessment of environmental contamination attributable to PU&D yard operations was initiated as part of the OU 10 Phase I RFI/RI (EG&G, 1995) and a pre-remedial investigation was conducted to assess VOCs in the subsurface soil (RMRS, 1997a)

Fate of Constituents Released to Environment

In 1993, 25 surface soil samples (plus a field duplicate) from IHSS 174A were analyzed for total metals, semivolatile organic compounds, pesticides, and polychlorinated biphenyl's (PCBs) Results are summarized in Table 3 11 and given in detail in Table 3 12

Four Aroclor-1254 results (0 920 to 9 000 mg/Kg) were observed in IHSS 174A (EG&G, 1995a) above the detection limit, and 3 of these were at concentrations greater than the current (2 32 mg/Kg) and proposed (2 24 mg/Kg) RFCA Tier II open space surface soil action levels All of the Aroclor-1254 concentrations are less than the current (232 mg/Kg) and the proposed (224 mg/Kg) Tier I open space surface soil action levels

Fourteen beryllium results were observed in IHSS 174A (EG&G, 1995) above the detection limit However, only 3 of these were at concentrations greater than the existing (4 08 mg/Kg) RFCA Tier II open space surface soil action levels, and only 4 were above the proposed (1 04 mg/Kg) RFCA Tier II open space surface soil action levels All of the beryllium concentrations were less than the existing (408 mg/Kg) and proposed (104 mg/Kg) Tier I open space surface soil action levels (DOE, 1996) Vanadium was observed in only one sample from IHSS 174A at a concentration of 43,400 mg/Kg which is less than the existing (53,800 mg/Kg) RFCA Tier II but above the proposed (13,400 mg/Kg) RFCA Tier I and II (both values are identical) surface soil action level Six surface soil samples from IHSS 174B were analyzed for total metals, SVOCs, pesticides, and PCBs (EG&G, 1995) No results were above existing or proposed RFCA Tier II surface soil action levels

In 1994, approximately 235 soil gas locations were sampled within and adjacent to IHSS 170, 174A, and 174B for VOC analysis The data presented in EG&G (1995), indicated that VOCs were potentially present in subsurface soils along the eastern third of the yard

A pre-remedial investigation of IHSSs 170, 174A and 174B was performed in August 1997 (RMRS, 1997a) The purpose of the pre-remedial investigation was to investigate the potential presence of a VOC contaminant source capable of impacting groundwater The investigation consisted of 20 soil borings and 38 subsurface soil samples analyzed for VOCs In most cases, the borehole locations correspond with the areas where VOC detections in soil gas samples were observed in the 1994 soil gas survey (RMRS, 1997b) Borehole locations associated with IHSS 174A were placed within the IHSS boundary and immediately northwest where VOC detections in soil gas were observed One borehole (17997) was located within the IHSS 174B boundary Table 3 13 summarizes the analytical results for soil borings associated with IHSSs 174A and 174B (RMRS, 1997b)

As shown in Table 3 13, PCE was detected throughout the sampled interval in borehole 17497 located in IHSS 174A The PCE concentrations observed were below the current (11,500 µg/Kg) RFCA Tier I subsurface soil action level, although 3 were above the proposed Tier II action level (31 5 µg/Kg) and one was above the proposed Tier I action level (3,150 µg/Kg)

Table 3.11 Summary of Surface Soil Analyses in IHSS 174A and 174B (EG&G, 1995), and Comparison of Detects to RFCA Tier I and Tier II Open Space Levels

Contaminants of Concern	Location	Number of Surface Soil Samples	Number of Detects Above Proposed RFCA Tier II Open Space Level	[illegible]	[illegible]	Current RFCA Tier I Open Space	Current RFCA Tier II Open Space	Range of Values for Detects Above Proposed RFCA Tier II Open Space Level (mg/kg)	[illegible]
Beryllium	**IHSS 174A**	**25**	**4**	[illegible]	[illegible]	408	4.08	**3.1**	[illegible]
Vanadium	**IHSS 174A**	**25**	**1**	[illegible]	[illegible]	53,800	53,800	**43,400**	[illegible]
Total metals (other than beryllium and vanadium)	IHSS 174A	25	0	[illegible]	[illegible]	Various	Various	N/A	[illegible]
PCBs: Aroclor 1254	**IHSS 174A**	**25**	**3**	[illegible]	[illegible]	232	2.32	2 5	[illegible]
Total metals	IHSS 174B	6	0	[illegible]	[illegible]	Various	Various	N/A	[illegible]
Semivolatile organic compounds	IHSS 174B	6	0	[illegible]	[illegible]	Various	Various	N/A	[illegible]
Pesticides	IHSS 174B	6	0	[illegible]	[illegible]	Various	Various	N/A	[illegible]
PCBs	IHSS 174B	6	0	[illegible]	[illegible]			N/A	[illegible]
Radionuclides (by HPGe)	IHSS 170, 174A, and 174B	46	0	[illegible]	[illegible]	Various	Various	N/A	[illegible]

Table 3.12 Summary of Individual Sample Locations, Laboratory Data, and Comparison to RFCA Tier I and Tier II Levels for Surface Soil in IHSS 174A

Contaminant of Concern	Total Number of Samples	Sample Location	Contaminant Level (mg/kg)	Comparison Value mg/kg	
				Current RFCA Tier I	Current RFCA Tier II
Aroclor -1254	25	**SS001293**	**3.400**	2.32	2.32
		SS001593	0 920	2.32	2.32
		SS001893	**2.500**	2.32	2.32
		SS001893 (duplicate)	**2.600**	2.32	2.32
		SS001993	**9.000**	2.32	2.32
		All other samples below detection limit			
Beryllium	25	**SS001093**	**35.1**	4.08	4.08
		SS001193	**3.1**	4.08	4.08
		SS001793	0 46	4.08	4.08
		SS001893	**5.0**	4.08	4.08
		SS001893 (duplicate)	**4.9**	4.08	4.08
		SS001993	**10.7**	4.08	4.08
		SS002093	0 59	4.08	4.08
		SS002193	0 66	4.08	4.08
		SS002293	0 14	4.08	4.08
		SS002593	0 34	4.08	4.08
		SS002693	0 27	4.08	4.08
		SS002793	0 28	4.08	4.08
		SS002893	0 20	4.08	4.08

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		SS002993	0 28
		SS003093	0 39
		All other samples below detection limit	
Vanadium	25	**SS001093**	**43,400***
		SS001193	3,080
		SS001293	26
		SS001393	15 5
		SS001493	15 1
		SS001593	21 4
		SS001693	19 8
		SS001793	140
		SS001893	5300
		SS001893 (duplicate)	5110
		SS001993	11300
		SS002093	1500
		SS002193	2210
		SS002293	19 2
		SS002393	22 4
		SS002493	19
		SS002593	23 5
		SS002693	22 8
		SS002793	49 9
		SS002893	365
		SS002993	194
		SS003093	52 9
		SS003193	185
		SS003293	36
		SS003393	22 8
		SS003493	16

Table 3.13 VOC Analytical Results for IHSS 174A and IHSS 174B Subsurface Soil (RMRS, 1997b) in µg/Kg

Borehole No	Sample Depth (ft)	PCE µg/Kg	TCE µg/Kg	Methylene Chloride µg/Kg
17097(A)	5 0-5 5	<630 (ND)	<630 (ND)	620J
17097(A)	10 0-10 5	<630 (ND)	<630 (ND)	664
17197(A)	5 5-6 0	<630 (ND)	<630 (ND)	685
17197(A)	10 25-10 5	<630 (ND)	<630 (ND)	689
17297(A)	5 0-5 5	<630 (ND)	<630 (ND)	1,600B
17297(A)	10 5-11 0	<630 (ND)	<630 (ND)	1,400B
17497	4 3-4 9	**750**	<630 (ND)	1,300B
17497	8 5-9 0	**830**	<630 (ND)	<630 (ND)
17497	11 0-11 5	**5,700**	<630 (ND)	<630 (ND)
17597	4 7-5 3	<630 (ND)	<630 (ND)	<630 (ND)
17597	11 0-11 5	<630 (ND)	<630 (ND)	<630 (ND)
17697	5 5-6 0	<630 (ND)	<630 (ND)	530JB
17697	9 8-10 3	<630 (ND)	<630 (ND)	610JB

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17997	5 0-5 5	<630 (ND)				<630 (ND)			<630 (ND)		
17997	9 5-10 0	<630 (ND)				<630 (ND)			<630 (ND)		
17997	15 0-15 5	<630 (ND)				<630 (ND)			<630 (ND)		
17997	19 5-20 0	<630 (ND)				<630 (ND)			<630 (ND)		
18997	5 0-5 5	<630 (ND)				**360J**			430JB		
18997	9 5-10 0	<630 (ND)				<630 (ND)			3,000JB		

DUP = Duplicate sample
A = Borehole location immediately adjacent to the IHSS
ND = Not detected
J = Estimated concentration of analyte detected below the method practical quantitation limit
B = Analyte detected in the method blank

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TCE was also detected in one sample (Borehole 18997) at an estimated (J-designated) concentration of 360 µg/Kg which is below the current and proposed RFCA Tier I subsurface action levels (9,270 and 3,280 µg/Kg, respectively), but above the proposed RFCA Tier II action level (32 8 µg/Kg)

Methylene chloride (a common laboratory contaminant) was also detected in most of the subsurface soil samples from IHSS 174B and was also detected in the method blank(s) associated with some of the analyses As a result, the identification of methylene chloride in the samples is most likely attributable to laboratory contamination

No VOC contaminants of concern (PCE, TCE, and 1,1,1-TCA) were detected in subsurface soils from IHSS 174B (RMRS, 1997b)

Each soil boring had a pre-work 17-point survey performed with a FIDLER Based on the survey results, the three highest FIDLER measurements were selected for surface soil samples and analyzed for isotopic radionuclides Although the isotopic results were below background levels, it is noted that the highest FIDLER measurements were within IHSS 174B (RMRS, 1997b)

Six groundwater samples were collected during the pre-remedial investigation of IHSSs 170, 174A and 174B Of the six samples, one sample from IHSS 174A and 174B (i e , one from each IHSS) was collected Table 3 14 summarizes the analytical results (RMRS, 1997b)

Analytical data from the pre-remedial investigation were evaluated for data usability and assessed in terms of the five data quality PARCC parameters The data is considered sufficient to meet the PARCC parameters and meets the projects' data quality objectives to characterize subsurface VOC contamination in IHSS 174A and IHSS 174B (RMRS, 1997b)

Based on the analytical results from the pre-remedial investigation, a VOC contaminant source equal to or above the RFCA Tier I subsurface soil action levels was not identified in either IHSS 174A or IHSS 174B (see Table 3 11) (RMRS, 1997b) RFCA Tier I subsurface soil action levels for organic contaminants are based on leachability to groundwater at Tier I groundwater action levels PCE is observed in the subsurface soil sampled from borehole 17497 in IHSS 174A as well as groundwater from that borehole (see Table 3 14) indicating that the area was likely affected by previous drum storage and handling operations However, VOC concentrations detected in the seven boreholes placed in the IHSS 174A area do not indicate that a residual source in excess of existing RFCA Tier I subsurface soil action levels remains

The PCE concentration of 1,700 µg/L detected in groundwater from borehole 17497 is above the RFCA Tier I and Tier II groundwater action levels of 500 and 5 µg/L, respectively Trichlorotrifluoroethane was detected in groundwater from IHSS 174B that also may indicate impact from past waste storage and handling practices (i e , freon-based lathe coolant) However, a RFCA action level or PPRG for the compound has not been calculated

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Table 3.14 VOC Analytical Results for IHSS 174A and IHSS 174B Groundwater (RMRS, 1997b) in µg/L

Borehole No	Sample Depth (ft)	PCE (µg/L)	[redacted]	1,1,1-TCA (µg/L)	[redacted]	Trichloro-trifluoroethane (µg/L)* *No existing RFCA action level or PPRG
17497	10 3	1,700	[redacted]	<5 (ND)	[redacted]	<250 (ND)
17997	7 9	<5 (ND)	[redacted]	21 J	[redacted]	40
17997 DUP	7 9	<5 (ND)	[redacted]	<5 (ND)	[redacted]	36

NA = Not Applicable
ND = Not detected
J = Estimated concentration of analyte detected below the method practical quantitation limit
B = Analyte detected in the method blank

Action/No Further Action Recommendation

Surface soil sampling data identify several locations in IHSS 174A which exceed proposed RFCA Tier II action levels Beryllium, Aroclor 1254, and vanadium (in one location) exceed the proposed Tier I and II action levels however, these are isolated occurrences and are not representative of the entire area For example, the location (SS001093) with the highest beryllium value is also the location of the single vanadium value

Five subsurface soil borings were located in IHSS 174A PCE was detected throughout the sampled interval in borehole 17497 with a maximum concentration of 5 7 mg/Kg TCE was also detected in one sample from borehole 18997 at an estimated concentration of 360 µg/Kg Methylene chloride was detected at 3 mg/Kg Both PCE and methylene chloride are below the existing RFCA Tier I subsurface soil action levels but above the proposed RFCA Tier I subsurface soil action levels (3 151 and 0 528 mg/Kg, respectively) Groundwater monitoring data indicates that the contamination in IHSS 174A has stabilized and the VOCs observed in subsurface soil and groundwater should be considered for natural attenuation No threat to surface water is expected IHSS 174A is not currently being proposed for NFA

Based on the subsurface soil sampling data, no current or potential source of contamination associated with IHSS 174B could be identified Trichlorotrifluoroethane, detected in groundwater, was not detected in the subsurface soil indicating that if a contaminant source existed, concentrations have attenuated As a result, IHSS 174B poses no threat to groundwater and therefore is proposed as NFA

Groundwater at IHSS 174A containing PCE concentrations above the RFCA Tier I and II groundwater action level is not considered in the Action/NFA recommendation because groundwater contamination at RFETS is addressed per RFCA by the Integrated Water Management Plan (KH, 1996) A plume of VOC contamination, which encompasses IHSS 174A, has been delineated The plume is monitored by the RFCA groundwater monitoring program at the perimeter Monitoring indicates that there are no known or potential surface water impacts Details on the groundwater monitoring program are reported annually in the Annual RFCA Groundwater Monitoring Report(s) (RMRS, 1998)

Comments

IHSSs 174A and 174B overlap with IHSS 170

The dumpster storage area was located along the western side of the east third of the PU&D Yard The dumpsters were stored in various locations over an area along the fence in an area significantly larger than that indicated on the IAG map There is visible staining on the ground in the dumpster storage area (DOE, 1992)

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These areas were RCRA-regulated units because they contained hazardous waste and were in operation in 1981 An Interim Status Closure Plan for these storage areas was prepared in 1986 and revised in 1988 These RCRA closure plans were superseded by the RFI/RI process outlined in the IAG EPA aerial photos reveal no activity in the PU&D area in August 1971 but clearly indicate that the area was used for storage in August 1978 (DOE, 1992)

Per the CDPHE letter of July 9, 1999, the Data Summary Report (RMRS, 1997b) and the Rockwell Internal Letter (Rockwell, 1987) are submitted under a separate transmittal

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Rockwell, 1987, Internal Letter to File from F J Blaha Subject Empty Drum Recycling Incident of 12/4/87, December 17

PAC REFERENCE NUMBER: 700-1108

IHSS Reference Number: Not Applicable

Unit Name: 771/774 Footing Drain Pond (AKA Bowmans Pond)

Approximate Location: N751,245, E2,084,067

Date(s) of Operation or Occurrence

1972 - Present

Description of Operation or Occurrence

Footing drain and storm drain flows from Building 771 and Building 774 both daylight in the general location of a small pond north of Building 774 (DOE, 1992)

Six underground process waste storage tanks, in use since the late 1950s (PAC 700-146 1- 146 6) were removed from the south side of Building 774 in 1972 (DOE, 1992) Physical failure of the process waste storage tanks was one of the major contributors of chemical and radioactive contamination to the soil around Building 774 It was suspected that some minor leakage from these tanks had seeped to the building footing drain tiles (DOE, 1992)

On July 21, 1980, an eight-year-old process waste line was discovered leaking southeast of Building 774 Process wastewater was observed seeping up in the soil on the south side of the road southeast of Building 774 The leaking process wastewater flowed down slope and through a 30-foot culvert, along a chain-link fence, and under the fence at the corner From this point, the liquid flowed under the unpaved access road into a boggy area north of Building 774 The vegetation in the boggy area was damaged where the spilled liquid formed a pool It was estimated that approximately 1,000 gallons had leaked from the process waste line (DOE, 1992)

There are two steel 8,000-gallon aboveground condensate receiving tanks located adjacent to and east of the Building 771/774 footing drain outfall The tanks and surrounding area were identified as an IHSS and are referenced as PAC 700-139 1N in the HRR (DOE, 1992) Several incidents associated with these tanks are described in the Historical Release Report (HRR), (DOE,1992)

Physical/Chemical Description of Constituents Released

A March 1971 report states that water coming from footing drains in the area was as high as 500 dpm/l gross alpha activity Water samples taken from the Building 774 footing drain in April 1971 indicated 400 dpm/l plutonium and 800 parts per million nitrate (DOE, 1992) Analysis of the spilled water from the July 1980 incident showed 2,500 pCi/l total alpha activity, 4,000 pCi/l gross beta activity, 10,000 mg/l nitrate and a pH of 12

In addition, a surface water and sediment-sampling program identified PCB contamination within and around the 771/774 Footing Drain Pond in the summer of 1991 The source of the PCBs has not been determined however, one employee recalled that a pole-mounted transformer north of Building 774 was hit by lightning and may have exploded (EG&G, 1991)

Responses to Operation or Occurrence

In approximately 1975, a control structure was installed at the Building 771/774 Footing Drain Pond consisting of a wet-well with a submersible pump The pump was designed to transfer water from the area of the pond to the Solar Evaporation Pond (SEP) 207C (DOE, 1992) The wet-well system was connected to the SEP Interceptor Trench Pump House (ITPH) system when the ITPH was installed in 1981 (see PAC 000-101) From approximately 1975 to 1981, water was pumped from the wet-well to SEP 207C Following the installation of the ITPH system, the water from the wet-well was collected by the ITPH system and pumped to SEP 207B-North (DOE, 1992)

Initial response to the July 1980 incident involving the broken process waste line was to stop the flow through the line thereby stopping the leak When the soil dried, a FIDLER survey was conducted to determine the extent of resulting contamination On July 24, 1980, the broken waste line was excavated and the problem was identified as a loose flange (DOE, 1992) No records could be found documenting cleanup actions from the incident.

In April of 1999, an extensive characterization study was conducted at PAC 700-1108 and the adjacent steam condensate tanks (IHSS 700-139 1N) The purpose of the investigation was to characterize the potential nature and extent of contamination in surface soil, subsurface soil/sediment, and surface water for the Pond and surrounding depositional environments adjacent to the Pond It was determined that characterization efforts were appropriate based upon the relatively high ranking priority established for the area under the Rocky Flats Cleanup Agreement (RFCA) (DOE, 1996a) Environmental Restoration (ER) ranking process In September of 1998, PAC 700-1108 was ranked 28 due largely to the overall history of spills or releases in the area and the intended use of the pond as a capture point for footing drain and storm runoff waters

Surface soil, subsurface soil/sediment, and surface water samples were collected from PAC 700-1108 and IHSS 139 1N in April 1999, to characterize the potentially contaminated media and provide the basis for future remedial decisions or an NFA determination Prior to the initiation

of fieldwork, an extensive review of all available historical data was performed for the area(s) and PCOCs were established (EG&G, 1994, 1995a & 1995b) The field investigation was then conducted in accordance with an Agency approved SAP (RMRS, 1999a), HASP, and approved Site procedures All analytical data collected underwent the appropriate verification and validation process, and were evaluated with respect to the Action Levels and Standard Framework (ALF) for Surface Water, Groundwater, and Soils (Attachment 5, RFCA, DOE,1996a & 1996b) Action levels and Standards in the ALF version dated May 17, 1999 and submitted for public review and comment on July 28,1999, were used as appropriate

In summary, there were no compounds identified from the investigation that exceeded (or approached) RFCA Tier I cleanup action levels Figure 3 5 identifies where sampling was conducted Conclusions and recommendations from the investigation are summarized in the following section

Fate of Constituents Released to Environment

Prior to the 1999 characterization, data from previous investigations, and general process knowledge of PAC 700-1108 and IHSS 139 1N indicated that the Sites were potentially contaminated Broken OPWL, UBC concerns and adjacent IHSSs within and surrounding Buildings 771 and 774 presented potential contaminant sources to the area Further, the foundation and storm drains from the nearby buildings have provided inflow to the 771/774 Footing Drain Pond and presented potential migration pathways for contaminants Upon review of all available information and final analysis gathered from the 1999 investigation as referenced in the Closeout Report for Bowmans Pond (PAC 700-1108) and the Steam Condensate Tanks (IHSS 139 1N), the following conclusions and recommendations have been made

- The 771/774 Footing Drain Pond sediments and surrounding soils (including those associated with IHSS 139 1N) are not as contaminated as first thought There were no compounds identified at or above the RFCA Tier I surface or subsurface soil action levels
- PCB contamination above Tier II surface and subsurface action levels (Aroclor-1254) was evident in the drainage upgradient of Bowmans Pond (SED 124 and BH10499) and within the sediments of the pond and depositional area at nearly identical concentrations (and locations) as observed in 1991 (EG&G, 1991)
- Radionuclide concentrations in soil and sediments are one to two orders of magnitude below the RFCA Tier II surface and subsurface soil action levels using the Tier II sum of ratios methodology (RMRS, 1999b)

- Soil and sediments within IHSS 139 1N are not contaminated with PCOCs identified from the ponds surface water, contaminants associated with steam condensate water stored in Tanks T-107 and T-108, or from the bermed sodium hydroxide tank located immediately adjacent to Building 774
- Concentrations of carbon tetrachloride in surface water from Bowmans Pond exceed the RFCA action level of 0 005 mg/L for surface water Although a source has not been clearly identified, it appears that upgradient groundwater contaminated with carbon tetrachloride is entering the Building 771 and/or 774 footing drains (probably from IHSS 118 1)

Action/No Further Action Recommendation

Based upon the findings presented above, and assessment of all other analytical data presented in the Closeout Report for Bowmans Pond (PAC 700-1108) and the Steam Condensate Tanks (IHSS 139 1N) (RMRS, 1999b), it is recommended that the investigation area adjacent to and including Bowmans Pond be evaluated to determine if the levels of contamination identified are protective of surface water and ecological resources Specifically, PCB contamination is localized within the study area at concentrations between RFCA Tier I and Tier II action levels and does not appear to be mobile Carbon tetrachloride identified in the surface water of PAC 700-1108 exceeds the RFCA action level of 0 005 mg/L for surface water but does not exceed RFCA action levels at down gradient monitoring stations Therefore, it is recommended that continued monitoring and evaluation be conducted intermitently to assess the water quality at PAC 700-1108 and the down-gradient monitoring stations

Comments

Following the July 1980 incident, a FIDLER survey was conducted and verified that the flow of process waste water did not extend beyond the boggy area to the north of Building 771 (DOE, 1992)

The 771/774 Footing Drain Pond is commonly referred to as Bowman's Pond

References

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RMRS, 1999b, Closeout Report for the Site Characterization of Bowmans Pond (PAC 700-1108) and Steam Condensate Holding Tanks (IHSS 139 1N), RF/RMRS-99-416 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

PAC REFERENCE NUMBER: 900-108

IHSS Reference Number	108, Buffer Zone Operable Unit
Unit Name	Trench T-1
Approximate Location	N749,500, E2,086,000

Date(s) of Operation or Occurrence

November 1954 - December 1962

Description of Operation or Occurrence

Historical documents indicate that at least 125 drums of depleted uranium chips and lathe coolant were buried in Trench 1 located northwest of Gate 9 and adjacent to the Building 901 Guard Tower (Figure 3 6) The original Trench T-1 dimensions were approximately 200ft long, 15 ft wide, and 5 ft deep however, the trench was extended in 1955 (DOE, 1992) The drums were covered with two feet of soil and the corners of the trench were marked (DOE, 1992)

The drums buried in Trench 1 were from Building 444 and off-Site sources consisting of potentially pyrophoric uranium oxide Drum packing methods are unclear and may have varied. A 1954 report indicates that some 30-gallon drums were packed inside of 55-gallon drums and graphite was used to fill in the space between the drums It is unclear whether this was the burial method used for all the drums in the trench

A report from November 1954 described a procedure for placing 30-gallon drums of combustible material inside 55-gallon drums of graphite Six of these drums were placed in a trench described as being located in the same area as Trench T-1 It is unclear whether this was the burial method for all drums in the trench (DOE, 1992)

In October 1982, a metal drum was punctured during routine weed cutting The drum was found to contain a mixture of water and oil The liquid was pumped into a new drum and transferred to await disposal The drum was to have been excavated and transferred to size reduction Another account of a 1982 event may describe the same or a similar incident involving two drums uncovered by weed cutting activities One drum reportedly contained an oily sludge with 4 3 picocuries per gram (pCi/g) plutonium and 1 2 microcuries per gram (μCi/g) uranium (DOE, 1992)

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Physical/Chemical Description of Constituents Released

Approximately 25,000 kilograms of depleted uranium chips were contained in the estimated 125 buried drums (DOE, 1992)

An inventory receipt records 38 drums disposed in the trench from November 17, 1954 to June 1, 1956 Most of the records indicate the contents to be metal turnings and still bottoms (residue from a distillation process), although 10 drums contained cemented cyanide waste The drums of concreted cyanide were placed in the same trench as highly combustible waste from Building 444 Copper alloy was also contained in some of the drums (DOE, 1992)

Inventory lists indicating the number of drums of oil disposed by on-Site burning or burial and the origin of the drums are available from April 1954 through April 1966 with the exception of a gap from August 1957 through August 1958 Eighty-five of the estimated 125 drums are documented in this record (DOE, 1992)

Two drums of "special" wastes from Building 444 which were placed in the trench in 1955 were removed and returned to Building 444 in 1956 at the request of the Accountability Group (DOE, 1992)

In 1958, authorization was granted for additional disposal in the trench of over 15,000 pounds of depleted uranium chips from Building 444 In 1962, authorization was again given for the disposal of approximately 7,500 pounds of depleted uranium chips (DOE, 1992)

Responses to Operation or Occurrence

A radiometric survey was performed in the area in October 1977 identifying four small hot spots ranging from 500 to 18,000 cpm of activity The spots were marked and mapped A radiometric survey was performed in June 1980 identifying numerous hot spots suspected to be depleted uranium Two boxes of uranium-contaminated soil were removed from the southeast corner of the Perimeter Security Zone (PSZ) in the spring of 1982 during construction of the PSZ It is not clear if the material removed is associated with the Oil Burn Pit (IHSS 153) or the trench Additionally, several monitoring wells were installed in October 1987 (DOE, 1992)

In the summer of 1995, electromagnetic surveys and ground penetrating radar confirmed the presence of drums and/or metallic objects in the Trench T-1 location The surveys indicate that a majority of the metallic objects were located in the westernmost half of the trench (DOE, 1997)

A Proposed Action Memorandum (PAM) to remediate the site as part of a CERCLA Accelerated Source Removal Action was approved by the Agencies in April 1998 (RMRS, 1998a) The excavation phase of the source removal action was initiated on June 10, 1998 and completed on August 20, 1998 The action included the excavation of materials buried in the trench and segregation of material during excavation and packaging of the waste streams based on waste

type The excavated trench length was 230 ft with 160 drums of depleted uranium and 10 drums of cemented cyanide removed from the excavation At present, most of the Trench 1 waste is being stored in RCRA Unit 15 B (RMRS, 1999) after initially being stored in an area on the north side of the Trench 1 project site within a Temporary Unit established for the project waste (RMRS, 1998b)

Because VOCs and PCBs were detected at or above regulatory thresholds (i e , RCRA, TSCA) in the drums of depleted uranium, the material could not be shipped to the treatment subcontractor for recycle as indicated in the PAM (RMRS, 1998a) The Trench 1 waste will remain in interim storage until a treatment process can be identified and the waste can be treated for off-Site disposal (RMRS, 1998b)

Fate of Constituents Released to Environment

The removal action was completed and verification samples were collected from the excavation bottom and sidewalls (Figure 3 7) Sampling was performed in accordance with the Sampling and Analysis Plan to Support the Source Removal at the Trench T-1 Site, IHSS 108 (RMRS, 1998c) Samples were collected and analyzed for radionuclides by gamma spectroscopy, VOCs, PCBs (as appropriate), and cyanide (as appropriate) Based on validated analytical results, the T-1 Closeout Report (RMRS, 1999) concluded that the trench has been successfully remediated relative to RFCA action levels and cleanup levels as specified in the PAM (RMRS, 1998a)

Sampling of the clean soil stockpile (segregated using a FIDLER and organic vapor analyzers during excavation) was performed in accordance with the Sampling and Analysis Plan (RMRS, 1998c) Results indicate, using the 95% Upper Confidence Level, that action levels specified in the PAM were met This soil stockpile was therefore returned to the excavation

In addition, soil from 1,434 drums of Investigation Derived Material (IDM) was returned to T-1 as part of the trench backfilling operations Approval for placement of this material was given by the EPA These (and other) activities are documented in the Closeout Report generated for the project (RMRS, 1999)

Action/No Further Action Recommendation

A source removal action was completed in the summer of 1998 This action was authorized by an Agency approved PAM for the Source Removal at Trench 1, IHSS 108 (DOE, 1998) A Closeout Report for the project was prepared and serves as the reference document for all activities and analytical data associated with the project (RMRS, 1999) The completion report details the waste and contaminants removed, the condition of the excavation following the removal action, the waste storage and treatment processes, and sample analytical results Because the source of contamination was successfully removed as documented in this narrative and associated reference documents, IHSS 108 meets the criteria set fourth in RFCA (DOE, 1996) for NFA

Comments

During backfilling operations on December 18, 1998, a five-gallon container was discovered in the north sidewall of the trench The contents of the container were historic sample bottles which were inerted, sampled and then placed in a 55-gallon steel drum on a layer of soil (RMRS, 1999)

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1997, *Annual Update for the Historical Release Report*, RF/RMRS-97-073 UN , Rocky Flats Environmental Technology Site, Golden, CO, September

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RMRS, 1998c, *Sampling and Analysis Plan to Support the Source Removal at the Trench T-1 Site, IHSS 108*, RF/RMRS-98-205 Rocky Flats Environmental Technology Site, Golden, CO, April

RMRS, 1999, Closeout Report for the Source Removal at the Trench 1 Site IHSS 108, RF/RMRS-99-302 UN, Rocky Flats Environmental Technology Site, Golden, CO, Rev , 0, June

PAC REFERENCE NUMBER: 900-112

IHSS Reference Number	112, Buffer Zone Operable Unit
Unit Name	903 Pad
Approximate Location	N749,000, E2,086,000

Date(s) of Operation or Occurrence

1958 - 1968

Description of Operation or Occurrence

Releases at the 903 Pad (IHSS 112) are considered the primary source of radiological contamination in the surficial soil in this part of RFETS Drums that contained hydraulic fluids and lathe coolant contaminated with plutonium and uranium were stored at this location from the summer of 1958 to January 1967 Approximately three fourths of the drums contained plutonium-contaminated liquids while most of the remaining drums contained uranium-contaminated liquids Of the drums containing plutonium, the liquid was primarily lathe coolant and carbon tetrachloride in varying proportions Also stored in the drums were vacuum pump oils, TCE, perchloroethylene , silicone oils, and acetone still bottoms (DOE, 1995, RMRS, 1997)

Leaking drums were noted in 1964 during routine handling operations The contents of the leaking drums were transferred to new drums, and the area was fenced to restrict access (DOE, 1992) From 1968 through 1970, some of the radiologically contaminated material was removed, the surrounding area was re-graded, and much of the area was covered by an imported base coarse material and an asphalt cap However, during drum removal and cleanup activities, wind and rain spread plutonium-contaminated soils to the east and southeast from the 903 Pad area resulting in IHSS 155 (903 Lip Area)

Physical/Chemical Description of Constituents Released

When cleanup operations began in 1967, a total of 5,237 drums were at the 903 Pad Approximately 420 drums leaked to some degree Of these, an estimated 50 drums leaked their entire contents The total amount of leaked material was estimated at around 5,000 gallons of contaminated liquid containing approximately 86 grams of plutonium (DOE, 1995, RMRS, 1997)

Responses to Operation or Occurrence

Contaminated areas around the leaking waste drums detected in 1964 were covered with fill dirt as a temporary measure Signs warning of contamination were then posted In November 1964, fencing was placed around the drum storage area for rabbit control and to enclose the contaminated soil Air samplers at the east fence detected contamination following high winds (DOE, 1992)

Building 903A was constructed in 1966 to filter and transfer contaminated oil from leaking drums The building was used to pre-filter the oil from the drums on the 903 Pad that could not be safely moved to Building 774 Oil filtered in Building 903A was then transferred to Building 774 for final processing The pre-filtering process was considered too time consuming and the step was eliminated several months after it began (DOE, 1992)

Drum removal from the area began in January 1967 for drums that were in the storage area for six months or less In August 1967, soil and rocks contaminated by rainwater runoff from the fenced area (east and down-gradient of the storage area) were shoveled up and deposited inside the fence An attempt was made to re-grade the surface to prevent a recurrence of the contamination spread (DOE, 1992) In June 1968, the drums and pallets were cleared from the area and shipped off-Site in waste boxes The 100,000 ft^2 area was contaminated with activities ranging from 2,000 to 300,000 dpm per 100 cm^2 Depth of contamination was to 8 inches or more, possibly up to 18 inches Vegetation was burned off the area in October 1968 in preparation for soil remediation (DOE, 1992)

In November 1968, six contaminated holding tanks located outside of Building 903 used in the filtering process were disconnected and crated for shipment as radioactive waste The radioactively contaminated fence from around the 903 Pad was also shipped off-Site as were two forklifts used in the drum transfer activity Building 904 which had been adjacent to Building 903A was moved to a location east of the Fire Barn (Building 331) Building 903A was moved to a location immediately east of Building 666 in 1991 (DOE, 1992)

The soil in the area exhibiting the greatest contamination was covered with fill material, soil sterilant, asphalt prime coat, and asphalt in November 1969 The area covered with asphalt was 148,104 ft^2 Adjacent areas, specifically, but not limited to, the southeast, had high activity in surficial soils Some of the soil to the southeast in the 903 Lip Area that had the highest activity readings indicated by several surveys was removed (DOE, 1992) Modification to the topography in and around the 903 Pad was completed in April 1971 to allow runoff to flow into Pond C-1 on Woman Creek (DOE, 1992)

Several investigations have been conducted at the 903 Pad to evaluate the extent of contamination, and the data collected have been reported in the Operable Unit (OU) 2 Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation/ Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Remedial Investigation

(RFI/RI) Report (DOE, 1995) In addition, the Final Sampling and Analysis Plan for the Site Characterization of the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1998) was implemented in 1998 and 1999 to further characterize and refine the volume of soils exceeding RFCA Tier I and Tier II Radionuclide Soil Action Levels and for VOCs exceeding Tier I Soil Action Levels (DOE, 1996)

Fate of Constituents Released to Environment

Results from the RFI/RI borehole samples (DOE, 1995) were compared to RFCA Radionuclide Soil Action Levels for open space (RSALs) (DOE, 1996) revealing that no samples exceeded the Tier I RSALs (RMRS, 1997) Soil samples collected beneath the 903 Pad in support of the 1980 soil decontamination project exceeded Tier I RSALs to a depth of 66 cm (26-inches) (RMRS, 1997) This depth exceeds the thickness of the asphalt pad and the depth of imported base coarse material and indicates radiological contamination of natural undisturbed soils at the 903 Pad However, no RFI/RI soil borings detected radiological contamination in excess of Tier I RSALs As a result, a discrepancy with the depth of radiological contamination between these investigations exists

Borehole sample results from the RFI/RI (DOE, 1995) were compared with RFCA Tier I VOC Soil Action Levels (DOE, 1996) and revealed that no samples exceeded the Tier I VOC Soil Action Levels (RMRS, 1997) The 1994-1995 soil gas survey indicated that the highest VOC concentrations were located immediately south of the southeast corner of the 903 Pad (DOE, 1995) PCE was detected at 27,000 micrograms per liter (ug/L) at a depth of 5 feet However, at adjacent soil gas locations and boreholes, TCE is either not detected or detected at very low concentrations Soil gas concentrations for the remaining portion of the 903 Pad ranged from 0 - 500 ug/L (DOE, 1995)

A VOC-contaminated groundwater plume extends from the 903 Pad area to the east The highest concentrations are found in groundwater samples collected from wells 06691 and 08891 located on the asphalt portion of the 903 Pad Concentrations of contaminants in groundwater decrease rapidly moving eastward from the 903 Pad area The primary groundwater contaminant in well 06691 is carbon tetrachloride with concentrations ranging from 51 to 100,000 ug/L Methylene chloride (150 to 35,000 ug/L) and chloroform (92 to 49,000 ug/L) are also observed Groundwater sample results for well 08891 indicate the primary contaminant as tetrachloroethene at concentrations ranging from 470 to 20,000 ug/L, along with carbon tetrachloride (290 to 17,000 ug/L), cis-1,2,dichloroethene (94 to 2,900 ug/L) and trichloroethene (210 to 4,600 ug/L) The next highest concentration of carbon tetrachloride in groundwater is found in samples collected from well 13191, which is located west of the well 06691 and off the western edge of the 903 Pad At this location, observed carbon tetrachloride levels ranged from 122 to 4,800 ug/L Groundwater analytical data indicates that one well, 09091 located on the 903 Pad, contains americium and plutonium activities in excess of Tier I Groundwater Action levels (DOE, 1995, DOE, 1996, and RMRS, 1997)

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The Final Sampling and Analysis Plan for the Site Characterization of the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1998) was implemented in 1998 and 1999 to further characterize and refine the volume of soils exceeding RFCA Tier I and Tier II Radionuclide Soil Action Levels and for VOCs exceeding Tier I Soil Action Levels (DOE, 1996) A total of 25 shallow boreholes to characterize radiological contamination and 15 deep boreholes to characterize VOC contamination have been completed on the 903 Pad

Action/No Further Action Recommendation

As discussed above, the site characterization of IHSS 112 was completed per the Final Sampling and Analysis Plan for the Site Characterization of the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1998) Documentation of the findings will be provided in the Site Characterization Report for the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1999) to be submitted to the Agencies in September 1999 Results from the characterization will aid in the assessment of remedial alternatives

Comments

None

References

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RMRS, 1999, *Site Characterization Report for the 903 Drum Storage Area, 903 Lip Area and Americium Zone,* RF/RMRS-99-427 UN, Rocky Flats Environmental Technology Site, Golden, CO September

PAC REFERENCE NUMBER: 900-153

IHSS Reference Number 153

Unit Name Oil Burn Pit No 2

Approximate Location N749,500, E2,086,000

Date(s) of Operation or Occurrence

March 1957 - May 1965

Description of Operation or Occurrence

Drums containing oil contaminated with uranium were burned in an open pit located north of Central Avenue and southeast of Building 991 These activities took place adjacent to the Mound (PAC 900-113) The oil burn pit was actually two trenches excavated parallel to each other The oil in the drums was dumped into the pit and ignited Oil was burned at night so smoke would not cause alarm (DOE, 1992) Approximately 80 drums of oil were burned in a typical month The drums were reused by the originating buildings until they were flattened and buried in the east trenches (PAC NE-110 and PAC NE-111) An October 1960 study stated that organic liquids were stored due to the lack of proper facilities to burn the wastes In February 1961, a study performed by the Health Physics group assured the operators that open pit burning was safe A second oil burning pit was cut in November 1961 and may be a reference to the parallel trench (DOE, 1992)

Physical/Chemical Description of Constituents Released

The materials contained in the drums were coolant, still bottoms, and waste oils from Building 444 and Building 881 Attempts were made to burn only non-radioactively contaminated oils During a burning test in February 1961, a direct count value monitored from the test was three times as high as the value from the Building 881 stack on that day This was considered acceptable because the burning occurred over a short period and would not materially add to the airborne activity released to the atmosphere (DOE, 1992)

Groundwater and incidental storm event water routinely entered the burn pit and would become contaminated Laboratory experiments resulted in reducing the oil/water activity from 300,000 dpm/l to 12,000 dpm/l uranium activity Additional experimentation involving the extraction of oil from water in the "old" oil burning pit is documented however, results from these studies could not be found (DOE, 1992)

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Responses to Operation or Occurrence

The oil burn residue and some flattened drums remaining in the oil burn pit were covered with fill material Signs were posted in the area of the oil burn pit in May 1959 to warn of contamination Air monitoring by Health Physics was routinely performed and high volume air samples were taken during burning of oil on several occasions

The burning of oil was halted in June 1965 to be replaced by a more efficient method of disposal Approximately 240 boxes of soil were excavated in 1978 from Oil Burn Pit No 2 and shipped offsite for disposal to remove the contaminated residues Clean-up criteria were based on radioactivity in the area and not solvent residuum Approximately 10,000 cubic feet of depleted uranium residue were estimated to be present in the area prior to the excavation

IHSS 153 was selected for further study and possible characterization sampling during the planning and research stages of the 1999 Potential No Further Action Characterization Program As referenced above, approximately 240 wooden boxes of contaminated soil were removed from the Oil Burn Pit No 2 in 1978 during the installation of the Protected Area (PA) security fence Confirmatory sampling using a geoprobe was planned in January of 1999 to obtain environmental characterization data from within the IHSS, however, this activity was disallowed for security reasons because the investigation area underlies the PA security fence Subsequently, future characterization of IHSS 153 will be dependent upon the D&D of the security fence and is reflected accordingly in the 2006 Baseline

Fate of Constituents Released to Environment

A controlled burning experiment was performed in an open pit north of Building 331 (PAC 300-128) prior to the initiation of burning in Oil Pit No 2 The results of this experiment, which focused on air emissions, were favorable in considering burning of uranium-contaminated oil in open pits as a disposal practice Decisions regarding the handling of contaminated residue left after the burns are unknown (DOE, 1992)

It is unknown weather the removal of approximately 240 waste crates in 1978 sufficiently removed the source of contamination from the Oil Burn Pit No 2 Further, it cannot be certain if the monitoring equipment used to ascertain levels of contamination during the removal operation were sufficient

Action/No Further Action Recommendation

Future characterization of IHSS 153 will be performed following D&D of the security fence and is reflected accordingly in the 2006 Baseline

Comments

In many documents, the total number of drums burned in the pit is listed as 1,082 This number appears to have omissions, for example from the period of January 1961 through June 1961 during which time 228 drums were burned The retired RFP employees interviewed confirmed that oil-burning activities were not halted between 1957 and 1961 Moreover, there are two references to oil repeatedly being burned near Building 991 in 1959 and again in 1960 None of the drums of oil burned between June 1957 and June 1961 was included in the derivation of 1,082 drums being burned At least 272 drums of oil were burned in addition to the 1,082 mentioned in many of the documents (DOE, 1992)

Additional research of historical photographs was conducted in February of 1999 confirming that the majority of IHSS 153 is under the PA security fence

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

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PAC REFERENCE NUMBER: 900-154

IHSS Reference Number 154

Unit Name Pallet Burn Site

Approximate Location N749,500, E2,085,500

Date(s) of Operation or Occurrence

1965

Description of Operation or Occurrence

According to persons interviewed for the CEARP Phase 1, wooden pallets were burned in an area southwest of Oil Burn Pit No 2 (PAC 900-153) No documentation was found which provided detail for this event (DOE, 1992)

Physical/Chemical Description of Constituents Released

No documentation was found which detailed the constituents released to the environment

Responses to Operation or Occurrence

The site was "removed" in the 1970s according to one reference (DOE, 1992)

IHSS 154 was selected for further study and possible characterization sampling during the planning and research stages of the 1999 Potential No Further Action Characterization Program The above reference states that the site was removed in the 1970s suggesting that the potential source (if any) was also removed Confirmatory sampling using a geoprobe was planned in January of 1999 to obtain environmental characterization data from within the IHSS however, this activity was disallowed for security reasons because the investigation area underlies the PA security fence Subsequently, future characterization of IHSS 154 will be dependent upon the D&D of the security fence and is reflected accordingly in the 2006 Baseline

Fate of Constituents Released to Environment

The site was identified as being located in the area now occupied by the PA security fence The area would have been disturbed when the PSZ was constructed in 1980

Retired RFP employees interviewed for this report, who were cognizant of the oil burning activities (see IHSS 153) did not know of any pallets burned in the area specified in CEARP

Phase 1 Long-term employees with the RFP fire department indicate that the Department does not have records of pallets being burned north of Central Avenue as located in CEARP

Action/No Further Action Recommendation

Future characterization of IHSS 154 will be performed following D&D of the security fence and is reflected accordingly in the 2006 Baseline

Comments

None

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

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REFERENCE NUMBER: 900-155

IHSS Reference Number 155, Buffer Zone Operable Unit

Unit Name 903 Lip Area

Approximate Location N749,000, E2,086,000

Date(s) of Operation or Occurrence

Approximately 1964 - 1973

Description of Operation or Occurrence

Surface soils to the east and southeast of the 903 Pad Drum Storage Area (PAC 900-112) exhibit elevated Plutonium ($Pu^{239/240}$) and Americium (Am^{241}) activities The contamination is primarily attributed to storm and wind dispersion from the 903 Pad Drum Storage Area with possible contributions from historical fires and stack effluent (DOE, 1992) Areas with elevated $Pu^{239/240}$ and Am^{241} activities (above background) east and southeast of the 903 Lip Area are referred to as the Americium Zone Spatial configurations of Am^{241} and $Pu^{239/240}$ contamination are associated because Am^{241} is a daughter product of plutonium decay Historical uses of the 903 Pad (PAC 900-112) are described in detail in the HRR, (DOE, 1992) Soil southeast of the 903 Pad was primarily impacted due to the prevailing wind direction and topography Drum removal activities, grading, and construction of the asphalt pad over PAC 900-112 was completed in 1969 By 1971, areas of the 903 Lip Area (PAC 900-155) surrounding the 903 Pad were graded with fill dirt placed over a wide area. Fill materials associated with the two areas are suspected to be contaminated as well (DOE, 1995 and RMRS, 1997)

Physical/Chemical Description of Constituents Released

An estimated16 grams of $Pu^{239/240}$ were distributed by wind and surface water runoff in a 2000 acre area predominantly to the east and southeast of the 903 Pad Prior to the installation of the asphalt pad on the 903 Drum Storage Area, it was estimated that 1 2 million ft^2 of soil was contaminated to levels above 500 dpm/g (DOE, 1992)

Based on recent investigations described in the following section of this narrative, the area of surface soil (0 – 6 inches) impacted above RFCA Tier II Radionuclide Soil Action Levels for open space (RSALs) (DOE, 1996) is estimated to be 209,689 ft^2 (using Best Fit method) in the 903 Lip Area and 379,333 ft^2 (using Best Fit method) in the Americium Zone (RMRS, 1999) Due to the RFCA Tier II RSAL exceedances in the Americium Zone, the 903 Lip Area (IHSS 155) boundary has been adjusted (see Plate 1) to include the areal extent of contamination above 50 pCi/g (DOE, 1997)

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Responses to Operation or Occurrence

Monitoring of the soil around the 903 Drum Storage Area has occurred periodically since 1958 Ground surveys for alpha detection were performed in 1964 and revealed contamination in the soil south and east of the 903 Drum Storage Area (DOE, 1992)

From 1968 through 1971, some of the radiologically contaminated material was removed, the surrounding area was re-graded and covered by an imported base coarse material and an asphalt cap However, during drum removal and cleanup activities, wind and rain spread plutonium-contaminated soils to the east and southeast from the 903 Drum Storage Area resulting in IHSS 155 (903 Lip Area) Several limited excavations have removed some of the plutonium-contaminated soils from the 903 Lip Area, however, results from the OU 2 Phase II RFI/RI sampling and analysis confirm that radiologically contaminated soils remain (DOE, 1995, RMRS, 1997)

In 1969, the area outside the storage area fence was graded and rocks and soil from this area were moved into the storage area in preparation for the asphalt pad construction In 1970, four inches of fill were placed on a 500 by 600 ft area to the east and south of the 903 Drum Storage Area The area was sprayed with various chemicals to stabilize the soil

In 1973, an aerial radiological survey indicated radionuclide activities in the 903 Lip Area that were higher than previously detected The results were confirmed by additional surveys Based on these results, it was estimated that approximately 2,000 square meters of soil would be removed to a depth of 15-cm by hand shoveling into 55-gallon drums The excavated soil was replaced with clean topsoil Efforts were taken to stabilize and re-vegetate the soil In 1976, thirty-five 4-ft by 4-ft by 7-ft crates (approximately 4,000 ft^3) of soil were removed from a highly contaminated hot spot within the 903 Lip Area Removal of soil took place in a portable building equipped with a high efficiency particulate air (HEPA) filter This method was considered safe but inefficient in comparing time consumption to the amount of contaminated soil requiring removal (Barker, 1982)

Soil removal activities were conducted again from June 28, 1978 through October 13, 1978 Heavy equipment was used to move the soil Weekly reports from the Environmental Analysis and Control group detail the soil removal activities Soil with contamination levels in excess of 2,000 cpm by FIDLER were removed The area excavated was estimated to be 43,000 ft^2 to a depth of approximately 9 inches The soil was packaged and shipped to the Nevada Test Site (NTS) In 1978, 1,448 waste crates were removed and shipped off-Site (Barker, 1982)

Numerous on-Site and off-Site soil surveys were performed to characterize the radioactive contamination from the 903 Drum Storage Area (DOE, 1995, RMRS, 1997) Most or all of the re-suspended airborne contamination was attributed to vehicular traffic on the East Perimeter Road High volume air samplers were installed east and southeast of the 903 Lip Area Because of the close proximity to the 903 Drum Storage Area and the 903 Lip Area, the area of the East

Perimeter Road had the highest levels of airborne contamination and was remediated in 1984 to reduce contaminant re-suspension (Setlock, 1984)

Several investigations have been conducted on the 903 Lip Area and Americium Zone to evaluate the extent of contamination, and the data collected have been reported in the Operable Unit (OU) No 2 Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation/ Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Remedial Investigation (RFI/RI) Report (DOE, 1995) In addition, the Final Sampling and Analysis Plan for the Site Characterization of the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1998) was implemented in 1998 and 1999 to further characterize and refine the volume of soils exceeding RFCA Tier I and Tier II Radionuclide Soil Action Levels and for VOCs exceeding Tier I Soil Action Levels (DOE, 1996)

Fate of Constituents Released to Environment

High Purity Germanium (HPGe) Surveys - HPGe surveys conducted in 1990 (EG&G, 1991) and 1994 (DOE, 1995, RMRS, 1997) provide useful information on the activity of Am^{241} in surface soils over the Americium Zone These data were collected on a 150 foot grid to accommodate the HPGe detector's field of view (FOV) of 150 feet in diameter (17,671 ft^2) Surveys were not conducted over the 903 Pad and Lip Area and soil samples were not collected to supplement the surveys

Surface Soil Radiological Data - Surface soil samples were collected in support of the OU2 Phase II RFI/RI (DOE, 1995) As detailed in the RFI/RI, samples were collected utilizing two sampling methods, the Colorado Department of Health (CDH) sampling method and the Rocky Flats (RF) sampling method Surface soil sample results were compared with RFCA Tier I RSALs The results of the comparison indicated that samples collected from five 2 5-acre plots exceed the Tier I RSALs These plots include two 2 5-acre plots (Plots 28 and 34) sampled using the CDH sampling method and three 2 5-acre plots (Plots 29, 36, and 46) sampled using the RF method (DOE, 1995 and RMRS, 1997)

Subsurface Soil Radiological Data - Two data sources were evaluated to determine the depth of radiological contamination within the 903 Lip Area and Americium Zone 1) RFI/RI borehole data (DOE, 1995), and 2) RFI/RI soil profile pits (DOE, 1995) Results from the RFI/RI borehole samples were compared to RFCA RSALs revealing that no samples exceed the Tier I RSALs However, samples collected from soil profile pit TR08 exceeded Tier I RSALs to a depth of 27 centimeters (cm) (10 6 inches[in]) Soil profile pits were sampled at 3 cm (1 2 in) intervals to a total depth of 1-meter (m) (3 28 feet) Samples collected at soil profile pit TR06, located adjacent to pit TR08, were not analyzed because activities exceeded the DOT shipping requirements It is assumed that radiochemical results from pit TR06 would also exceed Tier I RSALs, if analyzed (DOE, 1995 and RMRS, 1997)

The Final Sampling and Analysis Plan for the Site Characterization of the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1998) was implemented in 1998 and 1999 to further characterize and refine the volume of soils exceeding RFCA Tier I and Tier II Radionuclide Soil Action Levels and for VOCs exceeding Tier I Soil Action Levels (DOE, 1996) A total of 37 shallow boreholes to characterize radiological contamination and 2 deep boreholes to characterize VOC contamination have been completed in the 903 Lip Area Additionally, 1,110 *in-situ* HPGe measurements have been performed in the Americium Zone adjacent to and in a portion of the 903 Lip Area

Based upon results of the Site Characterization Report for the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1999) and summary of existing data from Actinide Migration studies at the Rocky Flats Environmental Site (DOE, 1997), the mapped extent of the 903 Lip Area has been revised as shown on Plate 1 The revised boundary was established using all available data (to date) and delineated at the 50 pCi/g contour

Action/No Further Action Recommendation

As discussed above, the site characterization of IHSS 155 was completed per the Final Sampling and Analysis Plan for the Site Characterization of the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1998) Documentation of the findings will be provided in the Site Characterization Report for the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1999) to be submitted to the agencies in September 1999 Results from the characterization will aid in the assessment of remedial alternatives

Comments

IHSS 155 overlaps IHSS 140

References

Barker, C J 1982, *Removal of Plutonium-Contaminated Soil from the 903 Lip Area During 1976 and 1978,* RFP-3226, January 25, 1982, Rockwell International, Rocky Flats Plant, Golden, CO

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1995, *Final Phase II RFI/RI Report, 903 Pad, Mound, East Trenches Area, Operable Unit No* 2, RF/ER-95-0079 UN, U S Department of Energy, Rocky Flats Plant, Golden, CO

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DOE, 1996, Final Rocky Flats Cleanup Agreement, Department of Energy, Rock Flats Environmental Technology Site, Golden, CO

DOE, 1997, *Summary of Existing Data on Actinide Migration at the Rocky Flats Environmental Site,* RF/RMRS-97-074 UN, US Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO

RMRS, 1997, *903 Drum Storage Area, 903 Lip Area and Americium Zone Data Summary,* RF/RMRS-97-086-UN, Rocky Flats Environmental Technology Site, Golden, CO, September

RMRS, 1998, *Sampling and Analysis Plan for the Site Characterization of the 903 Drum Storage Area, 903 Lip Area and Americium Zone,* RF/RMRS-97-084, Rev 1, Rocky Flats Environmental Technology Site, Golden, CO, August

RMRS, 1999, Site Characterization Report for the 903 Drum Storage Area, 903 Lip Area and Americium Zone, RF/RMRS-99-427 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

Setlock, G , 1984, Memorandum to G W Campbell, Rockwell International entitled "Environmental Analysis and Control Highlights for Week ending November 16, 1984", Rockwell International, Rocky Flats Plant, Golden, CO

PAC REFERENCE NUMBER: 900-1307

IHSS Reference Number Not Applicable

Unit Name Explosive Bonding Pit

Approximate Location N748,000, E2,086,500

Date(s) of Operation or Occurrence

1965 - Approximately 1968

Description of Operation or Occurrence

Explosive bonding experiments were conducted at the explosive forming area near Building 993 At least seven events took place within a few days in March 1968 in an experiment to explosively bond together flat plates of stainless steel and uranium alloy An experiment conducted on March 6, 1968, caused a piece of aluminum used in the experiment to be hurled a distance of 525 feet The explosive consisted of 192 grams of 40 percent dynamite The energy released from the dynamite drove the stainless steel plate into the radioactive material to form a bonded laminate

Other experiments of unknown nature took place in this general location for at least two and a half years Until March 1968, experiments took place inside buried sand-filled 55-gallon drums The explosive events took place below grade Air shocks from the explosions were objectionable to Building 991 occupants until a pit was dug into a hillside near Building 993 to house the apparatus and mitigate air shocks The 10 foot by 19 foot pit was approximately four feet deep (DOE, 1992)

Physical/Chemical Description of Constituents Released

Uranium alloy and stainless steel were the materials used in the experiments (DOE, 1992) No documentation was found which detailed the physical and chemical characteristics of the constituents if any released to the environment

Responses to Operation or Occurrence

As a result of the incident regarding aluminum being thrown from the pit, measures were to be evaluated to prevent malfunctions during experiments

Additional information regarding PAC 900-1307 is described in the comment section of this narrative

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Fate of Constituents Released to Environment

No documentation was found which detailed the fate of constituents released to the environment

Comments

Uranium alloy was involved in this process This area is considered a PAC because of the radioactive nature of this material

Interviews conducted with site employees regarding the use and location of the explosive bonding pit identified the specific location of the pit as being inside Building 993 (Richmond, 1999) The pit can still be seen at this location, however, it was filled with concrete at an undetermined date Based upon the new information presented above, the location for PAC 900-1307 has been re-located as shown on Plate 4 and Figure 3 8

References

DOE, 1992, *Historical Release Report*, Rocky Flats Environmental Technology Site, Golden, CO, June

Personnel communication Mr Lou C Richmond, WSLLC, September 13, 1999

PAC REFERENCE NUMBER: 900-1309

IHSS Number N/A

Unit Name OU 2, Field Treatability Unit

Approximate Location N750,000, E2,082,000

Date(s) of Operation or Occurrence

December 4, 1993

Description of Operation or Occurrence

On December 4, 1993, approximately 10 gallons of potentially contaminated water from an influent pipe system leading from Walnut Creek to the OU 2 treatment system were released to the environment The release was detected when a contractor responded to an alarm indicating that the release had occurred The contractor identified a slow leak coming from a connection in the secondary containment portion of the influent pipeline The source of the leak was a hole in the primary pipeline, which resulted from the separation of two pipes that make up the secondary pipeline Thirty to forty gallons of the water were contained by the secondary containment structure The 10 gallon release estimate was based on visual observation of the wetted soil area which measured approximately 2 ft by 3 ft (EG&G, 1994a)

Physical/Chemical Description of Constituents Released

Approximately 10 gallons of contaminated water designated as an "F001" listed hazardous waste were released The sources of the water being collected for treatment are referred to as SW59, SW61, and SW132, which contain surface water runoff from the PA and potential seep water from the Mound plume The water was pumped to the OU 2 Field Treatability Unit and treated for volatile organics, soluble metals and radioactive constituents Sampling was performed weekly for characterization Sampling events closest to the time of the incident took place on November 30, 1990, and on December 9, 1993 Validated analytical data for constituents detected in samples analyzed on November 30, 1993 and December 9, 1994 are presented in Table 3 15 (EG&G, 1994a)

Concentrations of trichloroethene, carbon tetrachloride and tetrachloroethene exceeded one or more standards on December 9, 1994, and tetrachloroethene exceeded Segment 5 stream standards on November 30, 1994 In addition, F001 listed contaminants including carbon tetrachloride, methylene chloride, trichloroethene and tetrachloroethene have been detected in the influent water at low levels based on over 100 sampling events that occurred from May 29, 1991 to December 3, 1993 Additionally, 1,2-dichloroethene, chloroform, 1,1-dichloroethane, and 1,1-dichloroethene

Table 3.15 Volatile Organic Compounds Detected in the OU 2 Collection System Water Samples November 30, 1993 And December 9, 1993 (DOE, 1994a)

Volatile Organic Analytes in Water Samples	Value Detected on November 30, 1993[1] (mg/L)	Value Detected on December 9, 1993[1] (mg/L)	SDWA[2] MCLs[3,4] (mg/L)	RCRA TCLP Regulatory Limit[4] (mg/L)	CO Water Quality Standards Big Dry Creek Segment 5 (mg/L)
Trichloroethene	0 001	0 064	0 005	0 50	0 066
Carbon Tetrachloride	0 003	0 140	0 005	0 70	0 018
Tetrachloroethene	0 002	0 054	0 005	0 50	0 0008
Cis-1,2-dichloroethene	0 009	0 060	0 070	NA	0 170
1,1-Dichloroethane	0 001	0 002	NA	NA	NA
1,1,1-Trichloroethane	0 0004	0 009	NA	NA	NA
Chloroform	0 0004	0 024	NA	6 00	0 006

[1]Sample dates closest to the December 4, 1993, spill included November 30, 1993, and December 9, 1993
[2]SDWA--Safe Drinking Water Act
[3]MCLs-- Maximum Contaminant Levels
[4]NA--Not Applicable

have been detected in the influent water at low levels Other contaminants that have been analyzed for but not detected include acetone, vinyl chloride, barium, cadmium, lead and mercury

Responses to Operation or Occurrence

The RCRA Contingency Plan was implemented as described in CPIR No 93-010 (EG&G, 1994a) The pumps were immediately shut down and the contractor personnel visually inspected the line for the release An emergency work package was initiated to repair the line, which was returned to service on December 8, 1993 The released material was not directly recoverable because it soaked into the soil Based on previous analytical results of the contaminated water, the immediate removal of the affected soil was not required because the contaminant concentrations in the soil should not pose an unacceptable risk to human health and the environment On January 7, 1994, a risk assessment was completed using the influent water data and acceptable risk between 10^{-4} and 10^{-6} was verified (EG&G, 1994a) A second risk assessment using CDPHE methodology was conducted in late March, 1994, which resulted in an even lower cancer risk of 10^{-7} to 10^{-8} (EG&G, 1994b)

Fate of Constituents Released to Environment

Ten gallons of contaminated water leaked into the soil The point of release was located near the intersection of a road and a culvert and immediately north of the field treatability unit. The contaminated soil was not removed Sampling to support characterization of PAC 900-1309 for possible designation as NFA was conducted per the Agency approved Sampling and Analysis Plan for Characterization of Potential No Further Action Sites (RMRS, 1999a) Surface and subsurface soils were collected at two locations within the spill area (see Figure 3 2, PAC 900-

1309) Results of the analyses are summarized in Tables 3 16 and 3 17 A correlation table (Table 3 18) is provided for future reference to match the RIN#, the site location, Borehole ID, event, depth and analysis performed All of the analytical results are presented in the Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) for PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313(RMRS, 1999b)

Table 3.16 Summary of Results for Surface Soil Samples within PAC 900-1309

Potential Contaminants Of Concern[1]	Number of Surface Soil Samples	Number of Detects > RFCA Tier II	Comparison Values[2] (mg/Kg or pCi/g)		Range of Values Detected (mg/Kg)	
			RFCA Tier II[3,4]	RFCA Tier I[5,6]		
Volatile Organic Compounds						
Trichlorofluoromethane	2	0	--	--	Not detected	0 002J

1 Contaminants of concern are those chemicals detected above background concentrations presented in the Geochemical Characterization of Background Surface Soils Background Soils Characterization Program (DOE, 1995)
2 PAC 900-1309 is within the Buffer Zone OU, Open Space RFCA Action Levels apply
3 Tier II values for non-radionuclides represent either 1E+06 carcinogenic risk to an open space user (or appropriate receptor) or a hazard index of 1 for non-carcinogenic toxicity
4 Tier II values for radionuclides are based on an annual dose limit of 15 mrem to a hypothetical resident
5 Tier I values for non-radionuclides represent either 1E+04 carcinogenic risk to an open space user (or appropriate receptor) or a hazard index of 1 for non-carcinogenic toxicity
6 Tier I values for radionuclides are based on an annual dose limit of 15 mrem to an office worker

Table 3.17 Summary of Results for Subsurface Soil Samples within PAC 900-1309

Potential Contaminants Of Concern[1]	Number of Surface Soil Samples	Number of Detects > RFCA Tier II	Comparison Values[2] (mg/Kg)		Range of Values Detected (mg/Kg)	
			RFCA Tier II[3,4]	RFCA Tier I[5,6]		
Volatile Organic Compounds						
Trichlorofluoromethane	2	0	--	--	Not detected	0 002J

1 Contaminants of concern are those chemicals detected above background concentrations presented in the Background Geochemical Report (EG&G, 1993)
2 PAC 900-1309 is within the Buffer Zone OU
3 Tier II values for non-radionuclides represent either 1E+06 carcinogenic risk to an open space user (or appropriate receptor) or a hazard index of 1 for non-carcinogenic toxicity
4 Tier II values for radionuclides are based on an annual dose limit of 15 mrem to a hypothetical resident.
5 Tier I values for non-radionuclides represent either 1E+04 carcinogenic risk to an open space user (or appropriate receptor) or a hazard index of 1 for non-carcinogenic toxicity
6 Tier I values for radionuclides are based on an annual dose limit of 15 mrem to an office worker

Trichlorofluoromethanewas detected in one surface soil and the corresponding subsurface soil sample at low levels It is suspected that the chemical is a laboratory introduced contaminant and not attributable to the release at PAC 900-1309 Additionally, trichlorofluoromethanewas detected in other method blanks analyzed by the laboratory and the chemical is not a contaminant of concern for the spilled influent

Table 3.18 Correlation Table for Characterization Samples at PAC 900-1309

RIN No	PAC	Borehole ID	Event No	Bottle No	Actual Sample Interval (Inches BGS)	Analysis	Comments
99A7767	900-1309	#1	001	001	4-9	VOC Grab	Soil
		"	002	001	22-29	VOC Grab	Soil
		#2	003	001	6-12	VOC Grab	Soil
		"	004	001	26-32	VOC Grab	Soil

Action/No Further Action Recommendation

Trichlorofluoromethane was detected in one surface soil and the corresponding subsurface soil sample at 0 002 mg/Kg Although a RFCA action level for trichlorofluoromethane does not exist, the observed concentration is well below the EPA Region 3 residential risk-based concentration for trichlorofluoromethane of 23,000 mg/Kg (EPA, 1999) EPA Region 3 risk-based concentrations are based on similar assumptions as RFCA action levels Based on the results of the soil samples collected, a contaminant source was not identified therefore, in accordance with RFCA (DOE, 1996), PAC NE-1309 is recommended for No Further Action

References

DOE, 1995, *Geochemical Characterization of Background Surface Soils Background Soils Characterization Program*, Rocky Flats Environmental Technology Site, Golden, CO, May

DOE, 1996, Final Rocky Flats Cleanup Agreement, Department of Energy, Rock Flats Environmental Technology Site, Golden, CO

EG&G, 1993, *Background Geochemical Report*, Rocky Flats Environmental Technology Site, Golden, CO, September

EG&G, 1994a, *Historical Release Report Sixth Quarterly Update, October 1, 1993 to January 1, 1994*

EG&G, 1994b, *Historical Release Report Seventh Quarterly Update, January 1, 1994 to March 31, 1994*

EPA, 1999, EPA Region III Risk-based Concentration Table, April

RMRS, 1999a, *Sampling and Analysis Plan for Characterization of Potential No Further Action Sites*, RF/RMRS-99-339, Rocky Flats Environmental Technology Site, Golden, CO, June

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RMRS, 1999b, *Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313,* Rocky Flats Environmental Technology Site, Golden, CO, July

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PAC REFERENCE NUMBER: 900-1311

IHSS Number N/A

Unit Name Septic Tank East of Building 991

Approximate Location N750199, E2,086,339

Date(s) of Operation or Occurrence

1952

Description of Operation or Occurrence

A sewage-related structure existed east of Building 991 during 1952 This structure is referred to in several documents by a variety of names including "temporary sewage disposal bed", "sewerage test area", septic tank and wooden septic tank (EG&G, 1994)

During an interview with Roy Tisdale, the carpenter believed to have been contracted for construction of a wooden septic tank, Mr Tisdale recalled that the location of the structure was approximately 200-300 yards east of Building 991 Mr Tisdale described a brownish, odorous liquid flowing from a roughly 4-inch diameter metal pipe into the wooden structure where the carpenters were working during construction of the tank At that time, an RFP employee made a reference to this liquid needing to be kept away from the creek and nearby cattle because it could "kill the cattle," therefore, Mr Tisdale did not complete the project because he believed that his men were being exposed to a potentially dangerous liquid Mr Tisdale believed that the source of the liquid was the office buildings to the west.

Based on review of waste disposal documents during 1952, the fluid flowing into the temporary sewage disposal bed (or septic tank) is believed to have been sewage On September 17 and 18, 1952 Paul Martin worked with Mr Thompson of the Austin Company to install a mixing box and temporary chlorinator for the effluent of the septic tank On September 17, the effluent from the waste disposal plant was sampled at two points the flume coming out of the septic tank near Building 991 and the first pond just below the septic tank Test results showed 11 ppm of dissolved oxygen During these testing and observation activities, it was noted that the estimated 1-2 hour septic tank retention time joined with less than the five-hour retention time in the first pond below the septic tank was inadequate Additionally, it was noted that a 12-hour retention time could be accomplished by putting in more ponds On September 25, 26 and 29, 1952, visual effluent samples taken from the septic tank were clear with no odor (EG&G, 1994)

In a September 17, 1952, letter to F H Langell, A L DeWaele locates the sewerage test area to the east of Building 91 (now known as Building 991) between the limited area fence and the cattle fence He reported a mild odor at the north side of the dam, which was approximately a quarter

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mile from the outlet of the 91 area He followed "the seepage from the dam about a hundred yards to Womans Creek then down the creek a few hundred yards " It is believed that this reference to "Womans Creek" was in error and was meant to refer to Walnut Creek or South Walnut Creek, which flows by the Building 991 Area Woman Creek is located nearly 2,000 feet south of Building 991 (EG&G, 1994)

A September 17, 1952, letter from John Epp to F H Langell describes the effluent of the sewage disposal plant as discharging from a wooden flume by gravity into a ravine with a free-fall of roughly 2 feet at the rate of 5 gallons/minute The effluent was described as clear, white and odorless The ditch above the discharge was dry and the ditch below the discharge contained a considerable amount of green algae No odor was noticed at the septic tank, discharge or ditch (EG&G, 1994)

Aerial photographs taken of RFP in 1953 indicate a possible ground disturbance in the general area east of Building 91 as described by Mr Tisdale and waste disposal documents, however, it should be noted that this photograph is of relatively poor quality (EG&G, 1994)

Physical/Chemical Description of Constituents Released

The influent to and effluent from the temporary waste disposal bed or septic tank is believed to have been sewage based on review of waste disposal documents during 1952 This sewage is expected to have had typical characteristics of sewage and is not expected to have been contaminated with radionuclides (EG&G, 1994)

Responses to Operation or Occurrence

No documentation was identified which noted the termination of usage or removal of the septic tank, however, the Building 995 activated sewage sludge treatment system may have replaced the use of this tank in 1953 (EG&G, 1994)

Fate of Constituents Released to Environment

A wooden flume is believed to have transported the sewage effluent from the waste disposal plant's septic tank to a ditch which discharged to a pond east of Building 991 before uncontrolled release of the effluent to South Walnut Creek This pond on South Walnut Creek is still in existence and is known as Pond B-2 No additional documentation was identified which detailed the fate of constituents released to the environment (EG&G, 1994)

During preparation of the Sampling and Analysis Plan (SAP) for Characterization of Potential No Further Action Sites (RMRS, 1999), it became apparent that the location of PAC 900-1311 as identified in the HRR Seventh Quarterly Update (EG&G, 1994) is not accurate Based upon the original PAC description and as described above, the flume was located across South Walnut Creek and up-gradient by several hundred feet

This location is not consistent or logical with the original description Based upon this finding, PAC 900-1311 has been relocated to its probable location (see Figure 3 8) Though the exact location cannot be positively identified, the area chosen for sampling lies within a topographical low This may have been the actual location of the flume, but if not, the selected area will show any elevated contamination as all surficial contamination would migrate through this area before leaving the topographic depression through a culvert (RMRS, 1999a)

Sampling to support characterization of PAC 900-1311 for possible designation as NFA was conducted per the Agency approved Sampling and Analysis Plan for Characterization of Potential No Further Action Sites (RMRS, 1999a) Surface samples were collected from a depth of zero to six inches and analyzed for SVOCs, pesticides/PCBs, metals and isotopic radionuclides (Figure 3 8) Shallow subsurface composite samples were also collected from a depth of six inches to a depth of two feet to evaluate the potential vertical distribution of these contaminants Results of the analyses are summarized in Tables 3 19 and 3 20 along with the appropriate RFCA action level A correlation table (Table 3 21) is provided for future reference to match the RIN#, the site location, Borehole ID, event, depth and analysis performed All of the analytical results are presented in the Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) for PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313(RMRS, 1999b)

As indicated in Tables 3 19 and 3 20, concentrations for the potential contaminants of concern identified at PAC 900-1311 were not detected at levels exceeding RFCA action levels For those contaminants of potential concern without a corresponding action level, the EPA Region 3 risk-based concentration table was reviewed Of those contaminants (carbazole, 2-methylnapthalene, and benzo(g,h,i)perylene), carbazole had a risk-based concentration of 2.9E+02 mg/Kg The concentration detected was below the risk-based concentration

Action/No Further Action Recommendation

Based on the results of the soil samples collected, a contaminant source was not identified therefore, in accordance with RFCA (DOE, 1996), PAC 900-1311 is recommended for No Further Action

Table 3.19 Summary of Surface Soil Sample Results for PAC 900-1311

Potential Contaminants Of Concern[1]	Number of Surface Soil Samples	Number of Detects > Proposed RFCA Tier II	Comparison Values[2] (mg/Kg or pCi/g)		Range of Values Detected (mg/Kg or pCi/g)	
			Proposed RFCA Tier II[3,4]	Proposed RFCA Tier I[5,6]		
Volatile Organic Compounds						
Toluene	4 (+1 duplicate)	0	4 09E+05	4 09E+05	Not detected	0 002J
Semivolatile Organic Compounds						
Acenaphthene	4 (+1 duplicate)	0	1.23E+05	1.23E+05	0 033J	0 040J
Fluorene	4 (+1 duplicate)	0	8 18E+04	8 18E+04	0 022J	0 027J
Phenanthrene	4 (+1 duplicate)	0	--	--	0 170J	0 380J
Anthracene	4 (+1 duplicate)	0	6 13E+05	6 13E+05	0 032J	0 061J
Carbazole	4 (+1 duplicate)	0	--	--	0 031J	0 043J
Fluoranthene	4 (+1 duplicate)	0	8 18E+04	8 18E+04	0 450	0 690
Pyrene	4 (+1 duplicate)	0	6 13E+04	6 13E+04	0.260J	0 640
Benzo(a)anthracene	4 (+1 duplicate)	0	7 84E+00	7 84E+02	0 100J	0 260J
Chrysene	4 (+1 duplicate)	0	7 84E+02	7 84E+04	0 130J	0.350J
Bis(2-ethylhexyl)phthalate	4 (+1 duplicate)	0	4 09E+02	4 09E+04	0 029J	0 040J
Benzo(b)fluoranthene	4 (+1 duplicate)	0	7 84E+00	7 84E+02	0 094J	0 0280J
Benzo(k)fluoranthene	4 (+1 duplicate)	0	7 84E+01	7 84E+03	0 110J	0 300J
Benzo(a)pyrene	4 (+1 duplicate)	0	7 84E-01	7 84E+01	0 120J	0 310J
Indeno(1,2,3-cd)pyrene	4 (+1 duplicate)	0	7 84E+00	7 84E+02	0 078J	0.200J
Dibenzo(a,h)anthracene	4 (+1 duplicate)	0	7 84E-01	7 84E+01	0 052J	0 110J
Benzo(g,h,i)perylene	4 (+1 duplicate)	0	--	--	0 082J	0 220J
Pesticides/PCBs						
None detected	4 (+1 duplicate)	0	NA	NA	NA	NA
Total Metals						
Silver	4 (+duplicate)	0	1 02E+04	1 02E+04	0 43	2 0
Copper	4 (+duplicate)	0	7 56E+04	7 56E+04	14 7	20 9
Zinc	4 (+duplicate)	0	6 13E+05	6 13E+05	99	167
Radionuclides						
Americium-241	4 (+duplicate)	0	38	215	.334	1 63
Plutonium-239/241	4 (+duplicate)	0	252	1429	.219	879
Uranium-235	4 (+duplicate)	0	24	135	- 007	075

1 Contaminants of concern are chemicals detected above background concentrations presented in the Geochemical Characterization of Background Surface Soils, Background Soils Characterization Program (DOE, 1995)
2 PAC 900-1311 is within the Industrial Area OU, Industrial Use RFCA Action Levels apply
3 Tier II values for non-radionuclides represent either 1E+06 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity
4 Tier II values for radionuclides are based on an annual dose limit of 15 mrem to a hypothetical resident
5 Tier I values for non-radionuclides represent either 1E+04 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity
6 Tier I values for radionuclides are based on an annual dose limit of 15 mrem to an office worker

Table 3.20 Summary of Subsurface Soil Sample Results for PAC 900-1311

Potential Contaminants Of Concern[1]	Number of Sub-Surface Soil Samples	Number of Detects > RFCA Tier II	Comparison Values[2] (mg/Kg or pCi/g)		Range of Values Detected (mg/Kg or pCi/g)	
			RFCA Tier II[3,4]	RFCA Tier I[5,6]		
Volatile Organic Compounds						
Cis-1,2-dichloroethene	4	0	1 4E-01	1 4E+01	0 001J	0 008
Toluene	4	0	7 07E+00	7 07E+02	Not detected	0 002J
Semivolatile Organic Compounds						
Naphthalene	4	0	1 01E+02	1 01E+04	0 024J	0 061J
2-Methylnaphthalene	4	0	--	--	Not detected	0 024J
Acenaphthene	4	0	5 34E+02	5 34E+04	0 041J	0 150J
Fluorene	4	0	6 94E+02	6 94E+04	0 030J	0 120J
Phenanthrene	4	0	--	--	0 240J	0 880
Anthracene	4	0	1 12E+04	>1E+06	0 057J	0 180J
Carbazole	4	0	--	--	0 022J	0 091J
Fluoranthene	4	0	5 37E+03	5 37E+05	0 240J	1 10
Pyrene	4	0	3 97E+03	3 97E+05	0 230J	1 10
Benzo(a)anthracene	4	0	1 60E+00	1 60E+02	0 087J	0 440
Chrysene	4	0	1 60E+02	1 60E+04	0 026J	0 540
Bis(2-ethylhexyl)phthalate	4	0	3 11E+03	3 11E+05	0 026J	0 120J
Benzo(b)fluoranthene	4	0	4 95E+00	4 95E+02	0 057J	0 430
Benzo(k)fluoranthene	4	0	4 95E+01	4 95E+03	0 076J	0 470
Benzo(a)pyrene	4	0	7 01E+00	7 01E+02	0 077J	0 490
Indeno(1,2,3-cd)pyrene	4	0	1 40E+01	1 40E+03	0 042J	0 330J
Dibenzo(a,h)anthracene	4	0	1 53E+00	1 53E+02	0 048J	0 110J
Benzo(g,h,i)perylene	4	0	--	--	0 046J	0 340J
Pesticides/PCBs						
None detected	4	0	NA	NA	NA	NA
Total Metals						
None detected above background	4	0	NA	NA	NA	NA
Radionuclides						
Americium-241	4	0	38	215	0 228	7 02
Plutonium-239/241	4	0	252	1429	0 929	8 34
Uranium-235	4	0	24	135	-0 017	0 151

1 Contaminants of concern are those chemicals detected above background concentrations presented in the Background Geochemical Characterization Report (EG&G, 1993)

2 PAC 900-1311 is within the Industrial Area OU, Industrial Use RFCA Action Levels apply

3 Tier II values for non-radionuclides represent either 1E+06 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity

4 Tier II values for radionuclides are based on an annual dose limit of 15 mrem to a hypothetical resident

5 Tier I values for non-radionuclides represent either 1E+04 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity

6 Tier I values for radionuclides are based on an annual dose limit of 15 mrem to an office worker

Table 3.21 Correlation Table for Characterization Samples at PAC 900-1311

RIN No	PAC	Borehole ID	Event No.	Bottle No	Actual Sample Interval (Inches BGS)	Analysis	Comments
			Borehole No #1 #2 #3 #4		Borehole No #1 #2 #3 #4		
99A7763	900-1311	4 Real	001 006 011 016	001	0-6 0-5 0-5 0-4	SVOCs	Soil/Sed
				001	0-6 0-5 0-5 0-4	PCBs	Soil/Sed
				001	0-6 0-5 0-5 0-4	Metals	Soil/Sed
				002	0-6 0-5 0-5 0-4	ISOs	Soil/Sed
				003	0-6 0-5 0-5 0-4	Rad Screen	Soil/Sed
			002 007 012 017	001	6-8 5-9 5-8 4-7	VOC Grab	Soil/Sed
			003 008 013 018	001	8-24 8-24 8-13 7-13	SVOCs	Soil/Sed
				001	8-24 8-24 8-13 7-13	PCBs	Soil/Sed
				001	8-24 8-24 8-13 7-13	Metals	Soil/Sed
				002	8-24 8-24 8-13 7-13	ISOs	Soil/Sed
			005 010 015 020	001	24-28 19-21 13-17 13-16	VOC Grab	Soil/Sed
		Borehole #3 DUPLICATE	021	001	0-5	SVOCs Dup	Soil/Sed
				001	0-5	PCBs Dup	Soil/Sed
				001	0-5	Metals Dup	Soil/Sed
				002	0-5	ISOs Dup	Soil/Sed
			022	001	5-8	VOC Dup	Soil/Sed
		Equipment Rinsate	023	001-003	n/a	VOA 8260	Aqueous
				004-005	n/a	SVOA 8270	Aqueous
				006	n/a	PCBs 8081	Aqueous
				007	n/a	Metals SW846	Aqueous
				008	n/a	ISOs	Aqueous

References

DOE, 1995, *Geochemical Characterization of Background Surface Soils Background Soils Characterization Program*, Rocky Flats Environmental Technology Site, Golden, CO, May

DOE, 1996, *Final Rocky Flats Cleanup Agreement,* Rocky Flats Environmental Technology Site, Golden, CO

EG&G, 1993, *Background Geochemical Report*, Rocky Flats Environmental Technology Site, Golden, CO, September

EG&G, 1994, *Historical Release Report, Seventh Quarterly Update, January 1, 1994 to March 31, 1994*

EPA, 1999, EPA Region III Risk-based Concentration Table, April

RMRS, 1999a, *Sampling and Analysis Plan for Characterization of Potential No Further Action Sites*, RF/RMRS-99-339, Rocky Flats Environmental Technology Site, Golden, CO, June

RMRS, 1999b, *Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313,* Rocky Flats Environmental Technology Site, Golden, CO, July

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PAC REFERENCE NUMBER: 900-1312

IHSS Number NA

Unit Name OU 2 Water Spill

Approximate Location N750,163, E2,086,346

Date(s) of Operation or Occurrence

March 10, 1994

Description of Operation or Occurrence

As part of the IM/IRA activities at OU 2, surface water was collected at surface water stations SW-59, SW-61 and SW-132, transferred via pipeline, and treated at the OU 2 treatment facility As a result of separation in the primary and secondary piping associated with the transfer line, approximately 200 gallons of surface water potentially containing hazardous waste constituents were released to the environment The pipeline was visually inspected eight hours prior to the discovery of the release The leak was discovered when the influent flow totalizer meter showed a marked decrease in the amount of water entering the system and the operator proceeded to visually inspect the pipeline The primary and secondary piping were found to be separated approximately 800 feet from the treatment unit, approximately 200 feet above the SW-61 collection point. The amount of liquid released to the soil was estimated to be approximately 200 gallons based on a visual determination of the size of the wetted area. In addition, possibly up to 6,000 gallons may have been released from the primary piping, flowed through secondary piping and been returned to the SW-61 collection point Approximately 97% of the water diverted to the treatment system was collected from SW-61 (EPA, 1994).

Physical/Chemical Description of Constituents Released

Approximately 200 gallons were released to the soil based on the area wetted by the release In addition, up to 6,000 gallons may have been returned to the SW-61 collection point from the secondary piping The water that was released was collected from SW-59, SW-61 and SW-132 (most of which is surface runoff from the Protected Area) Because this groundwater and surface water feeding Walnut Creek may contain hazardous waste constituents, the "contained-in" rule was considered applicable, and the water entering the OU 2 treatment system possibly contained "F001" listed hazardous waste This determination was based on analytical results from routine sampling of the influent, which showed F001 listed hazardous waste constituents in trace amounts Analytical results from sampling events of the influent water from May of 1993 and March of 1994 are summarized in Table 3 22 Several standards for comparative purposes are also presented Based on these historical data, F001 listed contaminants that have been detected include carbon tetrachloride, trichloroethene and tetrachloroethene Cis-1,2-dichloroethene,chloroform,

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1,1-dichloroethene,chloroform, 1,1-dichloroetheneand toluene have also been detected in the influent water but not at levels that constitute characteristic hazardous waste (EG&G, 1994)

Table 3.22 VOCs Detected in the OU 2 Collection System Water Samples

Volatile Organic Analytes in Water Samples	Value Detected on March 10, 1994[1] (mg/L)	Value Detected in May 1993[6] (mg/L)	SDWA[2] MCLs[3,4] (mg/L)	RCRA TCLP Regulatory Limit[4] (mg/L)	CO Water Quality Standards Big Dry Creek Segment 5 (mg/L)
Trichloroethene	0 005	0 003	0 005	0 50	0 066
Carbon Tetrachloride	0 002J[7]	0 003	0 005	0 70	0 018
Tetrachloroethene	0 005	0 002	0 005	0 50	0 0008
Cis-1,2-dichloroethene	0 009[5]	0 009	0 070	NA	0 170
Toluene	<0 005	0 0004	NA	NA	NA
1,1-Dichloroethene	<0 005	0 0008	0 007	0 07	0 000057
1,1,1-Trichloroethane	0 002J	--[8]	NA	NA	NA
Chloroform	<0 005	0 0007	NA	6 00	006

[1]Acetone (2BJ ug/L) and 2-Butanone (4BJ) were detected in both the sample and in the method blank B = Detected in method blank
[2]SDWA--Safe Drinking Water Act
[3]MCLs-- Maximum Contaminant Levels
[4]NA--Not Applicable
[5]Cis and Trans 1,2-dichloroethene totals combined
[6]Based on sampling events from May 1993 (Most recent validated data prior to March 10 sample)
[7]J Compound found below PQL Quantitation is estimated
[8]-- Value not presented, probably below detection limits

Responses to Operation or Occurrence

The operator immediately shut down the inlet pumps to the pipeline and the RCRA Contingency Plan was implemented Samples were taken of the influent water and the soil in the area affected by the release to confirm the concentration of hazardous waste constituents in the water and affected soil The pumps were de-energized immediately after the leak was discovered and personnel immediately began repairs on the pipe The system was back in normal operation within six hours of discovery of the leak (EG&G, 1994)

Based on the results of the historical analytical data of influent water and previous risk calculations, a decision was made on March 10, 1994 not to immediately remove the soil impacted by the release This decision was verified using risk calculations (CDPHE methodology) which resulted in a cancer risk of 10^{-7} to 10^{-8} (EG&G, 1994)

Fate of Constituents Released to Environment

None of the estimated 6,000 gallons which flowed back into the creek was recovered, however, the water returned to Walnut Creek is essentially indistinguishable from the periodic overflows of the water which exceed the 60 gpm treatment requirements of the OU 2 treatment unit (EG&G, 1994)

None of the influent releases were recovered The soil affected by the release was sampled on March 10, 1994 in two locations and analyzed for Volatile Organic Compounds (VOCs) and isotopic radionuclides The results for analytes detected above background are summarized in Table 3 23

Table 3.23 Summary of Results for PAC 900-1312

Potential Contaminants Of Concern[1]	Number of Surface Soil Samples	Number of Detects > RFCA Tier II	Comparison Values[2] (mg/kg or pCi/g)		Range of Values Detected (mg/kg or pCi/g)	
			RFCA Tier II[3,4]	RFCA Tier I[5,6]		
Volatile Organic Compounds						
2-Butanone	2 (+duplicate)	0	>1E+06	>1E+06	0 004	0 005 BJ
Tetrachloroethene	2 (+duplicate)	0	1 1E+02	1 1E+04	0 002	0 003J
Radionuclides						
Americium-241	2 (+duplicate)	0	38	209	0 86	0 92
Plutonium-239/241	2 (+duplicate)	0	252	1088	1 5	2 5

1 Contaminants of concern are those chemicals detected above background concentrations presented in the Geochemical Characterization of Background Surface Soils, Background Soils Characterization Program (DOE, 1995)

2 PAC 900-1312 is within the Industrial Area OU, Industrial Use RFCA Action Levels apply
3 Tier II values for non-radionuclides represent either 1E+06 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity
4 Tier II values for radionuclides are based on an annual dose limit of 15 mrem to a hypothetical resident.
5 Tier I values for non-radionuclides represent either 1E+04 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity
6 Tier I values for radionuclides are based on an annual dose limit of 15 mrem to an office worker

Action/No Action Recommendation

Based on the results of the soil samples collected at the time of the incident, a contaminant source was not identified (Table 3 23) therefore, in accordance with RFCA (DOE, 1996), PAC 900-1312 is recommended for No Further Action

Comments

Samples collected within PAC 900-1312 at the time of the release where not surveyed The PAC boundary was estimated at the time of the release and reported to the regulatory agencies

All of the analytical results are presented in the Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) for PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313(RMRS, 1999b)

References

EG&G, 1994, *Historical Release Report, Seventh Quarterly Update, January 1, 1994 to March 31, 1994*

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DOE, 1996, *Final Rocky Flats Cleanup Agreement,* Rocky Flats Environmental Technology Site, Golden, CO

RMRS, 1999b, *Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313,* Rocky Flats Environmental Technology Site, Golden, CO, July

PAC REFERENCE NUMBER: 900-1313

IHSS Number NA

Unit Name Seep Area near OU-2 Influent Piping

Approximate Location N750185, E2,086,175

Date(s) of Operation or Occurrence

March 18, 1994

Description of Operation or Occurrence

At approximately 2 00 p m on March 18, 1994, during a CDPHE inspection of Walnut Creek, two to three gallons of a glossy liquid substance was noticed collecting in a stagnant pool within the creek bed approximately ten feet downstream from the OU-2 water treatment facility intake Samples were collected by both plant and CDPHE personnel on March 18, 1994 Additional samples were collected by plant personnel on March 24, April 7, and October 25, 1994 Validated results from all but the October sampling event show elevated levels of vinyl chloride, and other VOCs (see Table 1) Vinyl chloride is not a contaminant of concern identified in the influent waters pumped to the OU-2 water treatment facility but may be a degradation product (EG&G, 1994)

Physical/Chemical Description of Constituents Released

As summarized in EG&G, 1994, the stagnant appearance of the pool and the glossy sheen observed on the surface were determined to be from anaerobic degradation typical of stagnant pond environments, however sample results from three sampling events indicate the presence of VOCs (Table 3 24)

Table 3.24 1994 Surface Water Sample Results for PAC 900-1313

Sample Date	Chemical	Result (µg/L)
18-Mar-94	1,1-Dichloroethane	19
18-Mar-94	Vinyl Chloride	65
18-Mar-94	1,2-Dichloroethene	1
24-Mar-94	1,1-Dichloroethane	24
24-Mar-94	Vinyl Chloride	84
24-Mar-94	1,2-Dichloroethene	2
07-Apr-94	1,1-Dichloroethane	22
07-Apr-94	Benzene	0.2
07-Apr-94	Trichloroethene	0.3
07-Apr-94	1,2-Dichloroethene	2
07-Apr-94	Tetrachloroethene	0.3

Responses to Operation or Occurrence

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Upon discovery, the water was sampled for VOCs and pumped to the OU-2 treatment system Samples were collected on March 18, March 24, and April 7, 1994 and the occurrence was reported to the Agencies (EG&G, 1994)

Fate of Constituents Released to the Environment

Sampling to support characterization of PAC 900-1313 for possible designation as No Further Action was conducted per the Agency approved Sampling and Analysis Plan for Characterization of Potential No Further Action Sites (RMRS, 1999a) Two surficial sediment and two subsurface sediment samples were collected at the location of the seep to verify the adequacy of the previous response action and to further characterize the potential for residual contaminants (see Figure 3 8) The samples were analyzed for VOCs and isotopics radionuclides Because the location of the seep area was very small (approximately 2 ft by 2 ft) and the location is known (i e , N750,185, E2,086,175), the sampling for this PAC was biased (i e , the sample locations were determined by grab methods)

Results of the analyses are summarized in Table 3 25 and Table 3 26 along with the appropriate RFCA action level A correlation table (Table 3 27) is provided for future reference to match the RIN#, the site location, Borehole ID, event, depth and analysis performed All of the analytical results are presented in the Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) for PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313(RMRS, 1999b)

Table 3.25 Summary of Surficial Sediment Results for PAC 900-1313

Potential Contaminants Of Concern[1]	Number of Surface Soil Samples	Number of Detects > RFCA Proposed Tier II	Comparison Values[2] (mg/Kg or pCi/g)		Range of Values Detected (mg/Kg or pCi/g)	
			Proposed RFCA Tier II[3,4]	Proposed RFCA Tier I[5,6]		
Volatile Organic Compounds						
Acetone	2	0	1 92E+05	1 92E+05	Not detected	0 069
Radionuclides						
Americium-241	2	0	38	215	0 299	0 500
Plutonium-239/241	2	0	252	1429	0 165	0 352
Uranium-235	2	0	24	135	0 0247	0 107

1 Contaminants of concern are those chemicals detected above background concentrations presented in the Background Geochemical Characterization Report (EG&G, 1993)
2 PAC 900-1313 is within the Industrial Area OU, Industrial Use RFCA Action Levels apply
3 Tier II values for non-radionuclides represent either 1E+06 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity
4 Tier II values for radionuclides are based on an annual dose limit of 15 mrem to a hypothetical resident.
5Tier I values for non-radionuclides represent either 1E+04 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity
6Tier I values for radionuclides are based on an annual dose limit of 15 mrem to an office worker

Table 3.26 Summary of Subsurface Sediment Results for PAC 900-1313

Potential Contaminants Of Concern[1]	Number of Sub-Surface Soil Samples	Number of Detects > RFCA Proposed Tier II	Comparison Values[2] (mg/Kg or pCi/g)		Range of Values Detected (mg/Kg)	
			Proposed RFCA Tier II[3,4,5]	Proposed RFCA Tier I[6,7,8]		
Volatile Organic Compounds						
None detected	2	0	NA	NA	NA	NA

1 Contaminants of concern are those chemicals detected above background concentrations presented in the Background Geochemical Characterization Report (EG&G, 1993)
2 PAC 900-1313 is within the Industrial Area OU, Industrial Use RFCA Action Levels apply
3 Tier II values for organic compounds are back-calculated soil concentrations that represent the concentration necessary to meet or exceed groundwater maximum contaminant levels or residential groundwater ingestion-based preliminary programmatic remediation goal values
4 Tier II values for non-radionuclides represent either 1E+06 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity
5 Tier II values for radionuclides are based on an annual dose limit of 15 mrem to a hypothetical resident.
6 Tier I values for organic compounds are back-calculated soil concentrations that represent the concentration necessary to meet or exceed 100 times the groundwater maximum contaminant levels or residential groundwater ingestion-based preliminary programmatic remediation goal values
7 Tier I values for non-radionuclides represent either 1E+04 carcinogenic risk or a hazard index of 1 for non-carcinogenic toxicity
8 Tier I values for radionuclides are based on an annual dose limit of 15 mrem to an office worker

Table 3.27 Correlation Table for Characterization Samples at PAC 900-1313

RIN No	PAC	Borehole ID	Event No	Bottle No	Actual Sample Interval (Inches BGS)	Analysis	Comments
99A7765	900-1313	#1	001	001	4-6	VOC Grab	Sediment
		"	002	001	34-36	VOC Grab	Sediment
		#2	003	001	5-9	VOC Grab	Sediment
		"	004	001	28-30	VOC Grab	Sediment
		#1	006	001	0-4	ISOs	Sediment
		#2	007	001	0-4	ISOs	Sediment

Action/No Further Action Recommendation

Based on the results of the sediment samples collected, a contaminant source was not identified All potential contaminants of concern were below RFCA action levels as presented in Table 2 and Table 3 Further, the installation of a trench designed to intercept and treat contaminated groundwater immediately upgradient from this PAC (i e. the Mound Plume Treatment System) ensures that contaminants are not being introduced into Walnut Creek at this location In accordance with RFCA (DOE, 1996), PAC 900-1313 is recommended for No Further Action

Comments

None

References

DOE, 1996, *Final Rocky Flats Cleanup Agreement,* Rocky Flats Environmental Technology Site, Golden, CO

EG&G, 1993, *Background Geochemical Characterization Report*, September 30

EG&G, 1994, *Historical Release Report Ninth Quarterly Update July 1, 1994 to September 30, 1994*

RMRS, 1999a, *Sampling and Analysis Plan for Characterization of Potential No Further Action Sites*, RF/RMRS-99-339, Rocky Flats Environmental Technology Site, Golden, CO, June

RMRS, 1999b, *Draft No Further Action Justification Document for Incorporation into the Historical Release Report (HRR) PACs NW-1501, NE-1408, NE-1409, 900-1309, 900-1311, 900-1312, 900-1313,* Rocky Flats Environmental Technology Site, Golden, CO, July

SECTION 4.0

OTHER SIGNIFICANT EVENTS (TO DATE)

PAC REFERENCE NUMBER: Not Applicable

IHSS Reference Number N/A

Unit Name East Trenches Plume Project

Approximate Location South Walnut Creek Drainage

Date(s) of Operation or Occurrence

February, 1999 - Present

Description of Operation or Occurrence

The East Trenches groundwater plume is located north of Central Avenue, east of the RFETS Protected Area, and along the northern edge of the B-series Ponds access road The East Trenches plume consists of groundwater contaminated with VOCs derived from the East Trenches Area and the 903 Pad The East Trenches Area is on the north side of the East Access Road, and was used between 1964 and 1967 for disposal of sanitary sewage sludge contaminated with low levels of uranium and plutonium Crushed drums and miscellaneous wastes were also disposed of in the East Trenches Area (DOE, 1992) Trenches T-3 and T-4 were excavated and treated as part of an accelerated source removal action in 1996

Surficial deposits in the South Walnut Creek Drainage consist of up to 18 feet of Rocky Flats Alluvium, colluvium and slump deposits Bedrock, sloping north, underlies the surficial deposits and consists of weathered claystone and minor sandstones associated with the Arapahoe No 1 Sandstone This sandstone is truncated by the South Walnut Creek drainage and sub-crops beneath the colluvium

Depth to groundwater is approximately 4 to 14 ft at the East Trenches Project Site and flows north to northeast with discharge to the surface as seeps and springs The flow rate for the East Trenches Plume is estimated to be approximately 2 5 feet per day (2 feet per day of the flow is attributed to the sub-cropping Arapahoe No 1 Sandstone)

Physical/Chemical Description of Constituents Released

A large plume of contaminated ground water is located in the East Trenches area Most of the ground water contamination is believed to be derived from the East Trenches area primarily associated with the trenches (or former trench locations) on the north side of the East Access Road Upgradient monitoring wells indicate that a component of the contaminated ground water in this area is derived from VOC contamination emanating from the 903 Pad consisting primarily of carbon tetrachloride, trichloroethylene (TCE), and tetrachloroethene (PCE)

Photo 1 East Trenches Plume Project (5/26/99)

Comments

The contaminated groundwater from the East Trenches plume directly discharges into the Valley Fill Alluvium underlying South Walnut Creek This deposit may also act as a preferential pathway for contaminated groundwater The treated water is expected to discharge to groundwater through an infiltration gallery, however, for added flexibility the system will be designed to allow discharge directly to South Walnut Creek if necessary

References

DOE, 1992, *Historical Release Report*, Rocky Flats Environmental Technology Site, Golden, CO, June

RMRS, 1999, *1998 Annual Rocky Flats Cleanup Agreement (RFCA) Groundwater Monitoring Report for the Rocky Flats Environmental Technology Site*, Volume I, RF/RMRS-99-433 UN, Golden, CO

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PAC REFERENCE NUMBER: Not Applicable

IHSS Reference Number	N/A
Unit Name	Solar Ponds Plume Project
Approximate Location	N751,445, E2,084,769

Date(s) of Operation or Occurrence

June 1999 - Present

Description of Operation or Occurrence

Five Solar Evaporation Ponds (PAC 000-101) located in the northeast corner of the PA were used to store and evaporate radioactive and hazardous liquid wastes A groundwater contaminant plume has been associated with potential leakage from the ponds resulting in nitrate and uranium contamination The ponds were drained and sludge removal was completed in 1995 To de-water the hillside north of the ponds, six interceptor trenches were installed in 1971 The original six trenches were abandoned in place and the current Interceptor Trench System (ITS) was installed in 1981 The ITS is generally keyed into bedrock and effectively collects most of the water, however, up to one third of the groundwater underflows the collection system, and eventually discharges to North Walnut Creek

On average, approximately 2 4 million gallons of water are collected from the ITS each year, pumped to the Modular Storage Tanks (MSTs) for storage, and then pumped to Building 374 for evaporation

A groundwater treatment collection system similar to the system installed for the East Trenches is currently under construction to effectively treat contaminated groundwater prior to discharge into north Walnut Creek Upon completion, water normally collected and stored in the MSTs for treatment at Building 374 will no longer be required The end result is believed to be a significant cost savings from current practices

Physical/Chemical Description of Constituents Released

The PCOCs associated with the contaminated groundwater are nitrate/nitrite and various uranium isotopes Groundwater sampling shows that the nitrates associated with the plume have a greater areal extent than the uranium The data suggest that the uranium in groundwater near North Walnut Creek is naturally occurring and not part of the uranium plume The highest concentrations of uranium are found adjacent to the SEPs, while the higher concentrations of nitrates are found at a greater distance from the SEPs The project conservatively assumes that the nitrate travels at the same rate as the groundwater, and is not retained Conversely, it appears

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that the uranium migration is retarded due to interaction with soils (i e uranium has a higher partition coefficient and retardation factor than nitrate)

This conclusion is supported by data collected by the Actinide Migration Study group at RFETS The partition coefficient of uranium in soil cores is between 30 liters per kilogram (L/kg) and 170 L/kg, suggesting a very low mobility of uranium in the soil and groundwater The ITS system does drain a portion of the uranium plume and the water from the ITS does contain uranium from that portion of the plume

Responses to Operation or Occurrence

Construction of a remedial trench system began in June 1999 and is expected to be completed by September 30, 1999 (see photo) This system consists of an approximately 1,100-foot long collection trench installed under the current North Perimeter Road Distance from North Walnut Creek ranges from 145 feet on the West Side to 580 feet from the creek on the East Side Upon completion, the new collection trench will be of sufficient depth to collect much of the water currently underflowing the ITS The collection trench cuts across a majority of the current ITS system and will collect the intercepted water The current ITS collection system located downgradient and outside of the trench boundary will subsequently be plugged Collected groundwater will be directed into two subsurface treatment cells, which will likely contain a mixture of organic material and zero-valent iron This material will reduce the nitrate concentration in the groundwater, along with natural and anthropogenic uranium The treatment cells were located in areas not expected to have high potential for slope failure An infiltration gallery was installed downgradient of the treatment cells to release the treated water back into the groundwater

The uppermost collection point of the ITS was designed to collect surface water from the Solar Ponds area for eventual treatment at Building 374 It is estimated that 700,000 gallons of water are collected and treated as a result of these trenches In addition to the collection and treatment system, this trench was blocked to reduce surface water collection

Fate of Constituents Released to Environment

Current data indicate that the primary contaminant associated with the Solar Ponds Plume is nitrate These data also indicate that uranium in groundwater within the down-gradient portion of the plume is naturally occurring Removal of sludges from the SEPs eliminated the nitrate and uranium potential source areas The long-term remedial action for the source area is expected to be capping, which will further retard movement of the uranium Numerous alternatives were evaluated to determine the most appropriate method to protect surface water in this area These included various *ex situ* treatment systems, *in situ* treatment such as phytoremediation, and reactive barriers, and direct release In addition, uncertainties were identified which include the

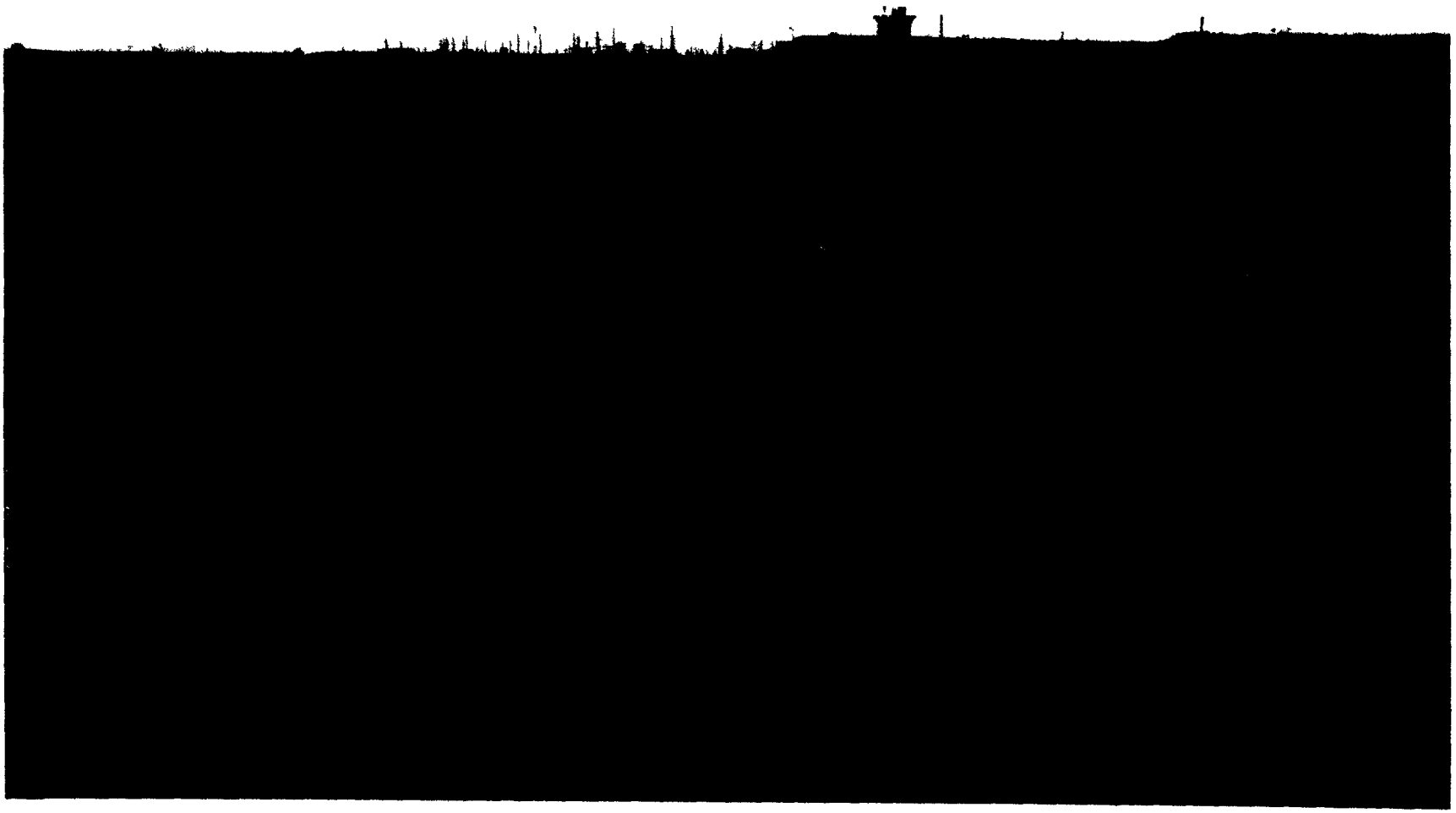

Photo 2 Solar Ponds Plume Project (6/30/99)

expected reduction in North Walnut Creek flow rates, reduction in influent groundwater flow, and uncertainties concerning nitrate and uranium contaminant movement

To address the known conditions, treatment options and uncertainties, a reactive barrier system similar to the Mound Plume is currently being installed

Treated water from the treatment cells and infiltration gallery will discharge back into the groundwater and flow to North Walnut Creek

Action/No Further Action Recommendation

The Solar Ponds Plume project is currently being managed and treated according to the amended IM/IRA (DOE 1992 and DOE 1995) Continued remediation and monitoring of this collection and treatment system will be used to evaluate the subsurface conditions and the system's effectiveness Recommendations will be made upon the evaluations of data collected in the future

Comments

A reactive barrier, consisting of a funnel system which will direct Solar Ponds Plume groundwater to a treatment cell containing zero-valence iron and a carbon source, was selected as the preferred remedial alternative Other alternatives considered in the Decision Document (RMRS, 1999) were found to be ineffective in treating the contaminants or did not achieve the long-term goals for the Solar Ponds Plume project and RFETS

References

DOE, 1992, *Historical Release Report*, Rocky Flats Environmental Technology Site, Golden, CO

RMRS, 1999, *1998 Annual Rocky Flats Cleanup Agreement (RFCA) Groundwater Monitoring Report for the Rocky Flats Environmental Technology Site*, Volume I, RF/RMRS-99-433 UN, Golden, CO

RMRS, 1999, *Draft Solar Ponds Plume Decision Document*, RF/RMRS-98-286 UN, Rocky Flats Environmental Technology Site, Golden, CO, January

Appendix 1

HRR Sites

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
[redacted]							
110	BZ	NE-110	Trench T-3	HRR[1]	Annual 1996[2] Annual 1997[3]	Annual 1997[3]	-
111 1	BZ	NE-111 1	Trench T-4	HRR[1]	Annual 1996[2] Annual 1997[3]	Annual 1997[3]	-
111 2	BZ	NE-111 2	Trench T-5	HRR[1]	-	-	-
111 3	BZ	NE-111 3	Trench T-6	HRR[1]	-	-	-
111 4	BZ	NE-111 4	Trench T-7	HRR[1]	-	-	-
111 5	BZ	NE-111 5	Trench T-8	HRR[1]	-	-	-
111 6	BZ	NE-111 6	Trench T-9	HRR[1]	-	-	-
111 7	BZ	NE-111 7	Trench T-10	HRR[1]	-	-	-
111 8	BZ	NE-111 8	Trench T-11	HRR[1]	-	-	-
142 1	6	NE-142 1	Pond A-1	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
142 2	6	NE-142 2	Pond A-2	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
142 3	6	NE-142 3	Pond A-3	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
142 4	6	NE-142 4	Pond A-4	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
142 5	6	NE-142 5	Pond B-1	HRR[1]	Annual 1997[3]	Annual 1997[3]	-

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
142 6	6	NE-142 6	Pond B-2	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
142 7	6	NE-142 7	Pond B-3	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
142 8	6	NE-142 8	Pond B-4	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
142 9	6	NE-142 9	Pond B-5	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
142 12	6	NE-142 12	Flume Pond (IAG Name Newly Identified Pond A-5) (Off-scale of Plate #2)	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
156 2	6	NE-156 2	Soil Dump Area between the A and B Series Drainages	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
166 1	6	NE-166 1	Trench A	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
166 2	6	NE-166 2	Trench B	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
166 3	6	NE-166 3	Trench C (2 areas designated on Plate #2)	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
167 1	6	NE-167 1	Landfill North Area Spray Field	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
167 2	7	NE-167 2	Pond Area Spray Field (Center Area)	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
167 3	7	NE-167 3	South Area Spray Field	HRR[1]	Annual 1996[2]	Annual 1996[2]	-

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
216 1	6	NE-216 1	East Spray Fields - North Area	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
216 2	BZ	NE-216 2	East Spray Field	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
216 3	BZ	NE-216 3	East Spray Field	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
NA	BZ	NE-1400	Tear Gas Powder Release	HRR[1]	-	-	EPA, 1992[4]
NA	BZ	NE-1401	NE Buffer Zone Gas Line Break	HRR[1]	-	-	EPA, 1992[4]
NA	BZ	NE-1402	East Inner Gate PCB Spill	HRR[1]	-	-	EPA, 1992[4]
NA	BZ	NE-1403	Gasoline Spill - Building 920 Guard Post	HRR[1]	-	-	EPA, 1992[4]
142 6	BZ	NE-1404	Diesel Spill at Pond B-2 Spillway	Quarterly 2[5]	Quarterly 3[6] Annual 1998[7]	Annual 1998[7]	-
NA	BZ	NE-1405	Diesel Fuel Spill at Field Treatability Unit (identified as NE-1404, reassigned NE-1405 in Quarterly 7[9])	Quarterly 3[6]	Quarterly 4[8] Quarterly 7[9] Annual 1998[7]	Annual 1998[7]	-
NA	BZ	NE-1406	771 Hillside Sludge Release	Quarterly 4[8]	Annual 1998[7]	Annual 1998[7]	-
NA	BZ	NE-1407	OU 2 Treatment Facility	Quarterly 4[8]	Quarterly 7[9] (900-1312) Quarterly 8[15] (900-1309)	-	-
[illegible]	BZ	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	BZ	NE-1409	Modular Tanks and 903 Treatment System Spill (formerly 200-903)	Quarterly 5	Quarterly 6	Annual 1997	
NA	BZ	NE-1410	Diesel Fuel Spill at Field Treatability Unit	Quarterly 7[9]	-	Quarterly 7[9]	-
NA	BZ	NE-1411	Diesel Fuel Overflowed from Tanker at OU 2 Field Treatability Unit	Quarterly 7[9]	-	Quarterly 7[9]	-
NA	BZ	NE-1412	Trench T-12 Located in OU-2 East Trenches	Quarterly 10[11]	-	-	-
NA	BZ	NE-1413	Trench T-13 Located in OU-2 East Trenches	Quarterly 10[11]	-	-	-
NORTHWEST BUFFER ZONE							
114	7	NW-114	Present Landfill	HRR[1]	-	-	-
170	BZ	NW-170	Pistol Storage Vault - Water Spills	HRR	Annual 1997	Annual 1997	
240	BZ	NW-240	Landfill and Chemical Storage Area	HRR	Annual 1997	Annual 1997	
241	BZ	NW-241	Chemical Storage Area	HRR	Annual 1997	Annual 1997	
195	16	NW-195	Nickel Carbonyl Disposal	HRR[1]	Annual 1996[2]	-	OU 16 CAD/ROD[12]

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
203	7	NW-203	Inactive Hazardous Waste Storage Area	HRR[1]	Annual 1996[2] Annual 1998[7]	Annual 1998[7]	-
NA	BZ	NW-1500	Diesel Spill at PU&D Yard (formerly NW-175)	Quarterly 3[6]	Quarterly 7[9] Annual 1998[7]	Annual 1998[7]	-
[illegible]							
114	7	NW-1502	Improper Disposal of Diesel-Contaminated Material at Landfill (formerly NW-177)	Quarterly 2[5]	Quarterly 3[6] Quarterly 7[9]	Quarterly 7[9]	-
114	7	NW-1503	Improper Disposal of Fuel Contaminated Material at Landfill	Quarterly 1[24]	Quarterly 7[9]	Quarterly 7[9]	-
114	7	NW-1504	Improper Disposal of Thorosilane Contaminated Material at Landfill	Quarterly 7[9]	-	Quarterly 7[9]	-
[illegible]							
142 10	5	SE-142 10	Pond C-1	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
142 11	5	SE-142 11	Pond C-2	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
209	5	SE-209	Surface Disturbance Southeast of Bldg 881	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
NA	BZ	SE-1600	Pond 7 – Steam Condensate Releases	HRR[1]	-	-	EPA, 1992[4]
NA	BZ	SE-1601	Pond 8 - Cooling Tower Discharge Releases	HRR[1]	-	-	EPA, 1992[4]
[illegible]							

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
[redacted]							
115	IA	SW-115	Original Landfill	HRR[1]	-	-	-
133 1	5	SW-133 1	Ash Pit 1	HRR[1]	-	-	-
133 2	5	SW-133 2	Ash Pit 2	HRR[1]	-	-	-
133 3	5	SW-133 3	Ash Pit 3	HRR[1]	-	-	-
133 4	5	SW-133 4	Ash Pit 4	HRR[1]	-	-	-
133 5	5	SW-133 5	Incinerator Facility	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
133 6	5	SW-133 6	Concrete Wash Pad	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
196	IA	SW-196	Water Treatment Plant Backwash Pond	HRR[1]	-	-	-
NA	BZ	SW-1700	Fuel Spill into Woman Creek Drainage	HRR[1]	-	-	EPA, 1992[4]
NA	BZ	SW-1701	Recently Identified Ash Pit (also referred to as TDEM-1)	Quarterly 9[13]	Annual 1997[3]	Annual 1997[3]	-
NA	BZ	SW-1702	Recently Identified Ash Pit (also referred to as TDEM-2)	Quarterly 9[13]	-	-	-
[redacted]							
101	IA	000-101	207 Solar Evaporation Ponds	HRR[1]	Annual 1998[7]	-	-
121	IA	000-121	Original Process Waste Lines (Includes Tanks T-2, T-3, T-10, T-14, T-16, T-40)	HRR[1]	Annual 1996[2] Annual 1998[7] (UBC 123)	-	-
162	IA	000-162	Radioactive Site - 700 Area Site # 2	HRR[1]	-	-	-

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
168	11	000-168	West Spray Field	HRR[1]	Annual 1996[2]	-	OU 11 CAD/ROD[14]
172	IA	000-172	Central Avenue Waste Spill	HRR[1]	Annual 1998[7]	Annual 1998[7]	-
190	IA	000-190	Caustic Leak (also referred to as Central Avenue Ditch)	HRR[1]	-	-	-
192	16	000-192	Antifreeze Discharge	HRR[1]	Annual 1996[2]	-	OU 16 CAD/ROD[12]
NA	IA	000-500	Sanitary Sewer System (not shown on Plate 4)	HRR[1]	-	-	-
NA	BZ	000-501	Roadway Spraying	HRR[1]	-	-	EPA, 1992[4]
NA	*IA*	*000-502 (see 900-1310)*	*ITS Water Spill (identified in Quarterly 2 as 000-502, re-assigned as 900-1310 in Quarterly 7, The number 000-502 is no longer in use)*	*Quarterly 2[5]*	*NA-*	*NA-*	*NA-*
NA	IA	000-503	Solar Pond Water Spill Along Central Avenue	Quarterly 7[9]	-	Quarterly 7[9]	-
[redacted]							
148	IA	100-148	Waste Spills	HRR[1]	Annual 1998[7] (UBC 123)	-	-

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	100-600	Mercury Spill – Valve Vault 124-B, Building 124	HRR[1]	-	-	EPA, 1992[4]
NA	IA	100-601	Building 123 Phosphoric Acid Spill	HRR[1]	-	-	EPA, 1992[4]
NA	IA	100-602	Building 123 Process Waste Line Break	HRR[1]	-	-	-
NA	IA	100-603	Building 123 Bioassay Waste Spill	HRR[1]	-	-	-
NA	IA	100-604	T130 Complex Sewer Line Leaks	HRR[1]	-	-	EPA, 1992[4]
NA	IA	100-605	Building 115 Hydraulic Oil Spill	HRR[1]	-	-	EPA, 1992[4]
NA	IA	100-606	Building 125 TCE Spill	HRR[1]	-	-	EPA, 1992[4]
NA	IA	100-607	Building 111 Transformer PCB Leak	HRR[1]	-	-	-
NA	IA	100-608	Building 131 Transformer Leak	HRR[1]	Annual 1998[7]	Annual 1998[7]	-
NA	IA	100-609	Building 121 Security Incinerator	HRR[1]	-	-	-
NA	IA	100-610	Asbestos Release – Building 123	HRR[1]	-	-	EPA, 1992[4]
NA	IA	100-611	Building 123 Scrubber Solution Spill	HRR[1]	-	-	-
NA	IA	100-612	Battery Solution Spill - Building 119	HRR[1]	-	-	EPA, 1992[4]
NA	IA	100-613	Asphalt Surface in Lay Down Yard North of Building 130 (identified as 000-501 in Quarterly 4[8], reassigned as 100-613 in Quarterly 7[9])	Quarterly 4[8]	Quarterly 7[9]	Quarterly 7[9]	-
[redacted]							
128	IA	300-128	Oil Burn Pit No 1	HRR[1]	-	-	-
134N	IA	300-134N	Lithium Metal Destruction Site	HRR[1]	-	-	-
134S	IA	300-134S	Lithium Metal Destruction Site	HRR[1]	-	-	-
135	IA	300-135	Cooling Tower Blowdown	HRR[1]	Annual 1997[3]	Annual 1997[3]	-

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
151	IA	300-151	Tank 262 Fuel Oil Spills	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
156 1	IA	300-156 1	Building 371 Parking Lot (2 locations designated on Plate #2)	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
171	IA	300-171	Solvent Burning Ground	HRR[1]	-	-	-
181	IA	300-181	Building 334 Cargo Container Area	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
186	IA	300-186	Valve Vault 12	HRR[1]	-	-	-
188	IA	300-188	Acid Leak	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
206	IA	300-206	Inactive D-836 Hazardous Waste Tank	HRR[1]	-	-	-
212	IA	300-212	Building 371 Drum Storage Area, Unit 63 (deferred to Part VIII of the RFETS RCRA Mixed Residues Modification, see Annual 1997)	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
NA	IA	300-700	Scrap Roofing Disposal	HRR[1]	-	-	EPA, 1992[4]
NA	IA	300-701	Sulfuric Acid Spill – Building 371	HRR[1]	-	-	EPA, 1992[4]
NA	IA	300-702	Pesticide Shed	HRR[1]	-	-	-
NA	IA	300-703	Building 331 North Area	HRR[1]	-	-	EPA, 1992[4]
NA	IA	300-704	Roof Fire, Building 381	HRR[1]	-	-	EPA, 1992[4]
NA	IA	300-705	Potassium Hydroxide Spill North of Building 374	HRR[1]	-	-	EPA, 1992[4]
NA	IA	300-706	Evaporator Tanks North of Building 374	HRR[1]	-	-	EPA, 1992[4]
NA	IA	300-707	Sanitizer Spill	HRR[1]	-	-	EPA, 1992[4]
NA	IA	300-708	Transformers North of Building 371	HRR[1]	Annual 1996[2]	Annual 1996[2]	-

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	300-709	Transformer Leak 334-1	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	300-710	Gasoline Spill North of Building 331	HRR[1]	-	-	EPA, 1992[4]
NA	IA	300-711	Ni-Cad Battery Spill Outside of Building 373	Quarterly 1[24]	Quarterly 7[9]	Quarterly 7[9]	-
NA	IA	300-712	1/2 gal Antifreeze Spilled by Street Sweeper Outside of Building 373	Quarterly 7[9]	-	Quarterly 7[9]	-
NA	IA	300-713	Caustic Spill North of Building 331	Quarterly 8[15]	-	Quarterly 8[15]	-
NA	IA	300-714	Laundry Waste Water Spill From Tank T-803, North of Building 374	Quarterly 10[11]	-	Quarterly 10[11]	-
NA	IA	300-715	Battery Acid Spill	Annual 1997[3]	-	Annual 1997[3]	-
[redacted]							
116 1	IA	400-116 1	West Loading Dock, Building 447 (IAG Name West Loading Dock Area)	HRR[1]	-	-	-
116.2	IA	400-116.2	South Loading Dock, Building 444 (IAG Name South Loading Dock Area)	HRR[1]	-	-	-
122	IA	400-122	Underground Concrete Tank	HRR[1]	Annual 1996[2] (000-121)	-	-
129	IA	400-129	Building 443 Oil Leak (deferred to IA OU, see Annual 1997)	HRR[1]	Annual 1996[2] Annual 1997[3]	-	-

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Appendix 1. HRR Sites at RFETS,

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
136 1	IA	400-136 1	Cooling Tower Pond West of Building 444 (IAG Name Cooling Tower Pond Northeast Corner of Building 460)	HRR[1]	-	-	-
136 2	IA	400-136 2	Cooling Tower Pond East of Building 444 (IAG Name Cooling Tower Pond West of Building 460)	HRR[1]	-	-	-
157 1	IA	400-157 1	Radioactive Site North Area	HRR[1]	-	-	-
157 2	IA	400-157 2	Radioactive Site South Area	HRR[1]	-	-	-
182	IA	400-182	Building 444/453 Drum Storage Area	HRR[1]	-	-	-
187	IA	400-187	Sulfuric Acid Spill (IAG Name Acid Leaks (2))	HRR[1]	-	-	-
191	IA	400-191	Hydrogen Peroxide Spill	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
193	16	400-193	Steam Condensate Leak	HRR[1]	Annual 1996[2]	-	OU 16 CAD/ROD[12]
204	15	400-204	Original Uranium Chip Roaster (deferred to D&D and UBC 447, see OU 15 CAD/ROD)	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
205	IA	400-205	Building 460 Sump #3 Acid Side	HRR[1]	-	-	-
207	IA	400-207	Inactive 444 Acid Dumpster	HRR[1]	-	-	-
208	IA	400-208	Inactive 444/447 Waste Storage Area	HRR[1]	-	-	-
NA	IA	400-800	Transformer 443-1	HRR[1]	Annual 1998[7]	Annual 1998[7]	-
NA	IA	400-801	Transformer, Roof of Building 447	HRR[1]	-	-	-
NA	IA	400-802	Storage Area, South of Building 334	HRR[1]	-	-	-
NA	IA	400-803	Miscellaneous Dumping, Building 460 Storm Drain	HRR[1]	-	-	-
NA	IA	400-804	Road North of Building 460	HRR[1]	-	-	-
NA	IA	400-805	Building 443 Tank #9 Leak	HRR[1]	-	-	EPA, 1992[4]

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	400-806	Catalyst Spill, Building 440	HRR[1]	-	-	EPA, 1992[4]
NA	IA	400-807	Sandblasting Area	HRR[1]	-	-	-
NA	IA	400-808	Vacuum Pump Leak - Building 442	HRR[1]	-	-	EPA, 1992[4]
NA	IA	400-809	Oil Leak - 446 Guard Post	HRR[1]	-	-	EPA, 1992[4]
NA	IA	400-810	Beryllium Fire - Building 444	HRR[1]	-	-	-
NA	IA	400-811	Transformer 443-2, Building 443	Quarterly 2[5]	Quarterly 3[6] Annual 1998[7]	Annual 1998[7]	-
NA	IA	400-812	Tank T-2 Spill in Building 460	Quarterly 6[16]	Quarterly 7[9] Quarterly 8[15]	Quarterly 8[15]	-
NA	IA	400-813	RCRA Tank Leak in Building 460	Quarterly 7[9]	-	-	-
NA	IA	400-814	Air Conditioner Compressor Release, Bldg 444 Roof	Quarterly 8[15]	-	Quarterly 8[15]	-
NA	IA	400-815	RCRA Tank Leak in Building 460	Quarterly 8[15]	-	-	-
NA	*IA*	*400-820 (see 600-1004)*	*Central Avenue Ditch Soil Spreading (identified in Quarterly 6 as 400-820, re-assigned as 600-1004 in Quarterly 7, The number 400-820 is no longer in use)*	*Quarterly 6[16]*	*Quarterly 7[9]*	*NA*	*NA*
			[redacted]				
117 1	IA	500-117 1	North Site Chemical Storage	HRR[1]	-	-	-
117 2	IA	500-117 2	Middle Site Chemical Storage	HRR[1]	-	-	-
158	IA	500-158	Radioactive Site – Building 551	HRR[1]	-	-	-
159	IA	500-159	Radioactive Site – Building 559	HRR[1]	-	-	-

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
169	IA	500-169	Waste Drum Peroxide Burial	HRR[1]	Annual 1998[7]	Annual 1998[7]	-
197	IA	500-197	Scrap Metal Sites	HRR[1]	-	-	-
NA	IA	500-900	Transformer Leak – 515/516	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	500-901	Transformer Leak – 555	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	500-902	Transformer Leak – 559	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	500-903	RCRA Storage Unit #1	HRR[1]	-	-	EPA, 1992[4]
NA	IA	500-904	Transformer Leak – 223-1/223-2	HRR[1]	-	-	-
NA	IA	500-905	Transformer Leak – 558-1	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	500-906	Asphalt Surface Near Building 559	Quarterly 4[8]	-	-	-
172	IA	500-907	Tanker Truck Release of Hazardous Waste From Tank 231B	Quarterly 9[13]	-	-	-
156 1, 186	IA	500-908	Oil Released from Air Compressor	Quarterly 12[17]	-	Quarterly 12[17]	-
158	IA	500-909	Release of Spent Photographic Fixer Solution	Annual 1996[2]	-	Annual 1996[2]	-

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
[redacted]							
117 3	IA	600-117 3	Chemical Storage – South Site	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
120 1	IA	600-120 1	Fiberglassing Area North of Building 664	HRR[1]	-	-	-
120 2	IA	600-120 2	Fiberglassing Area West of Building 664	HRR[1]	-	-	-
152	IA	600-152	Fuel Oil Tank 221 Spills	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
160	IA	600-160	Radioactive Site Building 444 Parking Lot	HRR[1]	-	-	-
161	IA	600-161	Radioactive Site - Building 664	HRR[1]	-	-	-
164 1	IA	600-164 1	Radioactive Slab from Bldg 776	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
189	IA	600-189	Nitric Acid Tank	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
NA	IA	600-1000	Transformer Storage Building 662	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	600-1001	Temporary Waste Storage Building 663	HRR[1]	Annual 1997[3]	-	-
NA	IA	600-1002	Transformer Storage - West of Building 666	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	600-1003	Transformers North and South of 661-675 Substation	HRR[1]	Annual 1996[2]	Annual 1996[2]	-

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
152, 157 1, 172	IA	600-1004	Central Avenue Ditch Cleaning Incident (formerly identified as 400-820)	Quarterly 6[16]	Quarterly 7[9]	-	-
NA	IA	600-1005	Former Pesticide Storage Area	Quarterly 7[9]	-	-	-
700 AREA							
118 1	IA	700-118 1	Multiple Solvent Spills West of Building 730	HRR[1]	Annual 1998[7]	-	-
118 2	IA	700-118 2	Multiple Solvent Spills South End of Building 776	HRR[1]	-	-	-
123 1	IA	700-123 1	Valve Vault 7	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
123 2	IA	700-123 2	Valve Vault West of Building 707	HRR[1]	-	-	-
124 1	IA	700-124 1	30,000 Gallon Tank (Tank #68)	HRR[1]	Annual 1996[2] (000-121)	-	-
124 2	IA	700-124.2	14,000 Gallon Tank (Tank #66)	HRR[1]	Annual 1996[2] (000-121)	-	-
124 3	IA	700-124 3	14,000 Gallon Tank (Tank #67)	HRR[1]	Annual 1996[2] (000-121)	-	-
125	IA	700-125	Holding Tank (Tank #66)	HRR[1]	-	-	-
126 1	IA	700-126 1	Westernmost Out-of-Service Waste Tank	HRR[1]	-	-	-
126 2	IA	700-126 2	Easternmost Out-of-Service Waste Tank	HRR[1]	-	-	-
127	IA	700-127	Low-Level Radioactive Waste Leak	HRR[1]	-	-	-
131	IA	700-131	Radioactive Site - 700 Area Site #1	HRR[1]	-	-	-

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
132	IA	700-132	Radioactive Site - 700 Area Site #4	HRR[1]	Annual 1996[2] (000-121) Annual 1997[3]	-	-
137	IA	700-137	Cooling Tower Blowdown Buildings 712 and 713 (IAG Name Cooling Tower Blowdown Building 774)	HRR[1]	-	-	-
138	IA	700-138	Cooling Tower Blowdown Building 779	HRR[1]	-	-	-
139 1N(a)	IA	700-139 1N(a)	Caustic/Acid Spills Hydroxide Tank Area	HRR[1]	Annual 1999		
139 1N(b)	IA	700-139 1N(b)	Caustic/Acid Spills Hydroxide Tank Area	HRR[1]			
139 1S	IA	700-139 1S	Caustic/Acid Spills Hydroxide Tank Area	HRR[1]			
139 2	IA	700-139.2	Caustic/Acid Spills Hydrofluoric Acid Tanks	HRR[1]	-	-	-
143	IA	700-143	Bldg 771 Outfall	HRR[1]	Annual 1997[3]	-	-
144	IA	700-144(N)	Sewer Line Overflow (IAG Name Sewer Line Break)	HRR[1]	-	-	-
144	IA	700-144(S)	Sewer Line Overflow (IAG Name Sewer Line Break)	HRR[1]	-	-	-
146 1	IA	700-146 1	Concrete Process Waste Tanks 7,500 Gallon Tank (31)	HRR[1]	-	-	-
146 2	IA	700-146.2	Concrete Process Waste Tanks 7,500 Gallon Tank (32)	HRR[1]	-	-	-
146 3	IA	700-146 3	Concrete Process Waste Tanks 7,500 Gallon Tank (34W)	HRR[1]	-	-	-
146 4	IA	700-146 4	Concrete Process Waste Tanks 7,500 Gallon Tank (34E)	HRR[1]	-	-	-
146 5	IA	700-146 5	Concrete Process Waste Tanks 3,750 Gallon Tank (30)	HRR[1]	-	-	-
146 6	IA	700-146 6	Concrete Process Waste Tanks 3,750 Gallon Tank (33)	HRR[1]	-	-	-
147 1	IA	700-147 1	Process Waste Line Leaks (IAG Name Maas Area)	HRR[1]	-	-	-

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
149 1	IA	700-149 1	Effluent Pipe	HRR[1]			
149 2	IA	700-149 2	Effluent Pipe	HRR[1]	-	-	-
150 1	IA	700-150 1	Radioactive Site North of Building 771 (IAG Name Radioactive Leak North of Building 771)	HRR[1]	-	-	-
150 2	IA	700-150 2	Radioactive Site West of Buildings 771 and 776 (IAG Name Radioactive Leak West of Building 771)	HRR[1]	-	-	-
150 3	IA	700-150 3	Radioactive Site Between Buildings 771 & 774 (IAG Name Radioactive Leak Between Buildings 771 & 774)	HRR[1]	-	-	-
150 4	IA	700-150 4	Radioactive Site Northwest of Building 750 (IAG Name Radioactive Leak East of Building 750)	HRR[1]	-	-	-
150 5	IA	700-150 5	Radioactive Site West of Building 707 (IAG Name Radioactive Leak West of Building 707)	HRR[1]	Annual 1998[7]	Annual 1998[7]	-
150 6	IA	700-150 6	Radioactive Site South of Building 779 (IAG Name Radioactive Leak South of Building 779)	HRR[1]	-	-	-
150 7	IA	700-150 7	Radioactive Site South of Building 776 (IAG Name Radioactive Leak South of Building 776)	HRR[1]	-	-	-
150 8	IA	700-150 8	Radioactive Site Northeast of Building 779 (IAG Name Radioactive Leak Northeast of Building 779)	HRR[1]	-	-	-
163 1	IA	700-163 1	Radioactive Site 700 Area Site No 3 Wash Area	HRR[1]	-	-	-
163.2	IA	700-163.2	Radioactive Site 700 Area Site No 3 Buried Slab	HRR[1]	-	-	-
185	16	700-185	Solvent Spill	HRR[1]	Annual 1996[2]	-	OU 16 CAD/ROD[12]
194	16	700-194	Steam Condensate Leak	HRR[1]	Annual 1996[2]	-	OU 16 CAD/ROD[12]
214	IA	700-214	750 Pad Pondcrete & Saltcrete Storage, Unit 25	HRR[1]	-	-	-

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
215	IA	700-215	Tank T-40, Unit 55 13	HRR[1]	-	-	-
NA	IA	700-1100	French Drain North of Building 776/777	HRR[1]	-	-	-
NA	IA	700-1101	Laundry Tank Overflow - Building 732	HRR[1]	-	-	-
NA	IA	700-1102	Transformer Leak – 776-4	HRR[1]	Annual 1996[2] Annual 1997[3]	Annual 1997[3]	-
NA	IA	700-1103	Leaking Transformers - Building 707	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	700-1104	Leaking Transformers - Building 708	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	700-1105	Transformer Leak - 779-1/779-2	HRR[1]	-	-	-
NA	IA	700-1106	Process Waste Spill - Portal 1	HRR[1]	-	-	-
NA	IA	700-1107	Compressor Waste Oil Spill - Building 776	HRR[1]	-	-	EPA, 1992[4]
[redacted]							
NA	IA	700-1109	Uranium Incident - Building 778	HRR[1]	-	-	EPA, 1992[4]
NA	IA	700-1110	Nickel Carbonyl Burial West of Building 771	HRR[1]	-	-	EPA, 1992[4]
NA	IA	700-1111	Leaking Transformer - Building 750	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	700-1112	Leaking Transformer - 776-5	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
101	IA	700-1113	Water Released from 207C Solar Evaporation Pond	Quarterly 11[18]	-	Quarterly 11[18]	-

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	700-1114a	Release During Liquid Transfer Operations from Bldg 774	Annual 1997[3]	-	Annual 1997[3]	-
NA	IA	700-1114b	Release During Liquid Transfer Operations from Bldg 774	Annual 1997[3]	-	Annual 1997[3]	-
NA	IA	700-1115	Identification of Diesel Fuel in Subsurface Soils	Annual 1997[3]	-	-	-
150 7	IA	700-1116	Leaking Transformer South of Building 776	Annual 1998[7]	-	-	-
NA	IA	700-1117	Building 701 Water Line, Soil Put-back	Annual 1998[7]	-	Annual 1998[7]	CDPHE 1998[19]
102	1	800-102	Oil Sludge Pit	HRR[1]	Annual 1997[3]	-	OU 1 CAD/ROD[20]
103	1	800-103	Chemical Burial	HRR[1]	Annual 1997[3]	-	OU 1 CAD/ROD[20]
104	1	800-104	Liquid Dumping	HRR[1]	Annual 1997[3]	-	OU 1 CAD/ROD[20]
105 1	1	800-105 1	Bldg 881 Westernmost Out of Service Fuel Tanks	HRR[1]	Annual 1997[3]	-	OU 1 CAD/ROD[20]
105 2	1	800-105 2	Bldg 881 Easternmost Out of Service Fuel Tanks	HRR[1]	Annual 1997[3]	-	OU 1 CAD/ROD[20]
106	1	800-106	Bldg 881, Outfall	HRR[1]	Annual 1997[3]	-	OU 1 CAD/ROD[20]

Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
107	1	800-107	Bldg 881, Hillside Oil Leak	HRR[1]	Annual 1997[3]	-	OU 1 CAD/ROD[20]
145	1	800-145	Sanitary Waste Line Leak	HRR[1]	Annual 1997[3]	-	OU 1 CAD/ROD[20]
147 2	IA	800-147 2	Bldg Conversion Activity Contamination Area	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
164 2	IA	800-164 2	Radioactive Site 800 Area Site #2, Building 886 Spills	HRR[1]	-	-	-
164 3	IA	800-164 3	Radioactive Site 800 Area Site #2, Building 889 Storage Pad	HRR[1]	-	-	-
177	BZ	800-177	Building 885 Drum Storage and Paint Storage (IAG Name Building 885 Drum Storage Area)	HRR[1]	-	-	-
178	15	800-178	Building 881 Drum Storage Area	HRR[1]	Annual 1996[2]	-	OU 15 CAD/ROD[21]
179	15	800-179	Building 865 Drum Storage Area (defer to D&D and UBC 447, refer to OU 15 CAD/ROD)	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
180	15	800-180	Building 883 Drum Storage Area (defer to D&D and UBC 447, refer to OU 15 CAD/ROD)	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
211	15	800-211	Building 881 Drum Storage, Unit 26	HRR[1]	Annual 1996[2]	-	OU 15 CAD/ROD[22]
217	15	800-217	Building 881, CN Bench Scale Treatment, Unit 32	HRR[1]	Annual 1996[2]	-	OU 15 CAD/ROD[22]
NA	IA	800-1200	Valve Vault 2	HRR[1]	-	-	-
NA	IA	800-1201	Radioactive Site South of Building 883	HRR[1]	-	-	-
NA	IA	800-1202	Sulfuric Acid Spill, Building 883	HRR[1]	-	-	EPA, 1992[4]

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	800-1203	Sanitary Sewer Line Break Between Buildings 865 and 886	HRR[1]	-	-	EPA, 1992[4]
NA	IA	800-1204	Building 866 Spills	HRR[1]	-	-	-
NA	IA	800-1205	Building 881, East Dock	HRR[1]	-	-	-
NA	IA	800-1206	Fire, Building 883	HRR[1]	-	-	EPA, 1992[4]
NA	IA	800-1207	Transformer 883-4	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	800-1208	Transformer 881-4	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	800-1209	Leaking Transformers, 800 Area	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	800-1210	Transformer 865-1 and 865-2	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
NA	IA	800-1211	Capacitor Leak, Building 883	HRR[1]	-	-	EPA, 1992[4]
NA	IA	800-1212	Building 866 Sump Spill	Quarterly 5[10]	-	-	-
[redacted]							
109	BZ	900-109	Trench T-2 - Ryan's Pit	HRR[1]	Annual 1996[2] Annual 1997[3]	Annual 1997[3]	-

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
112	BZ	900-112	903 Pad Area (IAG Name - 903 Drum Storage Area)	HRR	Annual 1997 Annual 1998 Annual 1999		
113	BZ	900-113	Mound Area	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
119 1	1	900-119 1	West Scrap Metal Storage Area and Solvent Spill (CAD/ROD Specifies Maintenance/D&D Tasks to Close IHSS 119 1) i e , **Deferred Status**	HRR[1]	Annual 1996[2] Annual 1997[3] Annual 1998[7]	-	-
119 2	1	900-119 2	East Scrap Metal Storage Area and Solvent Spill	HRR[1]	Annual 1996[2] Annual 1997[3]	-	OU 1 CAD/ROD[20]
130	1	900-130	Contaminated Soil Disposal Area East of Bldg 881	HRR[1]	Annual 1997[3]	-	OU 1 CAD/ROD[20]
140	BZ	900-140	Hazardous Disposal Area (IAG Name Reactive Metal Destruction Site)	HRR[1]	Annual 1997[3] Annual 1998[7]	Annual 1998[7]	-
141	6	900-141	Sludge Disposal	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
159	IA	900-159	Radioactive Site -	HRR	Annual 1997		
160	BZ	900-160	903 Drum Storage Area	HRR	Annual 1997 Annual 1998		
165	6	900-165	Triangle Area	HRR[1]	-	-	-
173	IA	900-173	South Dock - Building 991 (IAG Name Radioactive Site - 900 Area)	HRR[1]	-	-	-

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
175	IA	900-175	S&W Building 980 Container Storage Facility	HRR[1]	-	-	-
176	IA	900-176	S&W Contractor Storage Yard	HRR[1]	-	-	-
183	BZ	900-183	Gas Detoxification Area	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
184	IA	900-184	Building 991 Steam Cleaning Area	HRR[1]	-	-	-
210	IA	900-210	Building 980 Cargo Container, Unit 16	HRR[1]	Annual 1997[3]	Annual 1997[3]	-
213	IA	900-213	Unit 15, 904 Pad Pondcrete Storage	HRR[1]	-	-	-
NA	IA	900-1300	RO Plant Sludge Drying Beds	HRR[1]	-	-	EPA, 1992[4]
NA	IA	900-1301	Building 991 Enclosed Area	HRR[1]	-	-	-
NA	IA	900-1302	Gasoline Spill	HRR[1]	-	-	EPA, 1992[4]
NA	IA	900-1303	Natural Gas Leak	HRR[1]	-	-	EPA, 1992[4]
NA	IA	900-1304	Chromic Acid Spill - Building 991	HRR[1]	-	-	EPA, 1992[4]
NA	IA	900-1305	Building 991 Roof	HRR[1]	-	-	EPA, 1992[4]
NA	IA	900-1306	Transformers 991-1 and 991-2	HRR[1]	Annual 1996[2]	Annual 1996[2]	-
[illegible]							
NA	IA	900-1308	Gasoline Spill Outside of Building 980	Quarterly 6[16]	Quarterly 8[15]	-	-
[illegible]							

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	900-1310	ITS Water Spill (identified as 000-502 in Quarterly 2, reassigned 900-1310 in Quarterly 7[9])	Quarterly 2[5]	Quarterly 3[6] Quarterly 7[9]	-	-
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
101	IA	900-1314	Solar Evaporation Pond 207B Sludge Release	Quarterly 9[13]	-	Quarterly 9[13]	-
NA	IA	900-1315	Tanker Truck Release on East Patrol Road, North of Spruce Ave	Quarterly 10[11]	Quarterly 11[18]	Quarterly 11[18]	-
NA	BZ	900-1316	Elevated Chromium (total) Identified During Geotechnical Drilling	Quarterly 10[11]	-	Quarterly 10[11]	-
176	IA	900-1317	Soil Released from Wooden Crate in 964 Laydown Yard	Quarterly 11[18]	-	Quarterly 11[18]	-
NA	IA	900-1318	Release of F001 Listed Waste Water to Soil (identified as 900-1307 in Annual 1997, reassigned 900-1318 in Annual 1998)	Annual 1997[3]	Annual 1998[7]	Annual 1997[3]	-
[illegible]							
199	3	OFF-SITE AREA 1	Off-Site Area 1	HRR[1]	Annual 1997[3]	-	OU 3 CAD/ROD[22]
200	3	OFF-SITE AREA 2	Great Western Reservoir	HRR[1]	Annual 1997[3]	-	OU 3 CAD/ROD[22]

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
201	3	OFF-SITE AREA 3	Standley Lake	HRR[1]	Annual 1997[3]	-	OU 3 CAD/ROD[22]
202	3	OFF-SITE AREA 4	Mower Reservoir	HRR[1]	Annual 1997[3]	-	OU 3 CAD/ROD[22]
UNDER BUILDING CONTAMINATION							
NA	IA	UBC-122	Building 122 (UBC-122)	HRR[1]	-	-	-
NA	IA	UBC-123	Building 123 (UBC-123)	HRR[1]	Annual 1998[7]	-	-
NA	IA	UBC-125	Building 125 (UBC-125)	HRR[1]	-	-	-
NA	IA	UBC-331	Building 331 (UBC-331)	HRR[1]	-	-	-
NA	IA	UBC-371	Building 371 (UBC-371)	HRR[1]	-	-	-
NA	IA	UBC-374	Building 374 (UBC-374)	HRR[1]	-	-	-
NA	IA	UBC-439	Building 439 (UBC-439)	HRR[1]	-	-	-
NA	IA	UBC-440	Building 440 (UBC-440)	HRR[1]	-	-	-
NA	IA	UBC-441	Building 441 UBC-441)	HRR[1]	-	-	-
NA	IA	UBC-442	Building 442 (UBC-442)	HRR[1]	-	-	-
NA	IA	UBC-444	Building 444 (UBC-444)	HRR[1]	-	-	-
NA	IA	UBC-447	Building 447 (UBC-447)	HRR[1]	-	-	-
NA	IA	UBC-528	Building 528 (UBC-528)	HRR[1]	-	-	-
NA	IA	UBC-559	Building 559 (UBC-559)	HRR[1]	-	-	-
NA	IA	UBC-701	Building 701 (UBC-701)	HRR[1]	-	-	-
NA	IA	UBC-707	Building 707 (UBC-707)	HRR[1]	-	-	-
NA	IA	UBC-731	Building 731 (UBC-731)	HRR[1]	-	-	-

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Appendix 1. HRR Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	UBC-770	Building 770 UBC-770)	HRR[1]	-	-	-
NA	IA	UBC-771	Building 771(UBC-771)	HRR[1]	-	-	-
NA	IA	UBC-774	Building 774 (UBC-774)	HRR[1]	-	-	-
NA	IA	UBC-776	Building 776 (UBC-776)	HRR[1]	-	-	-
NA	IA	UBC-777	Building 777 (UBC-777)	HRR[1]	-	-	-
NA	IA	UBC-778	Building 778 (UBC-778)	HRR[1]	-	-	-
NA	IA	UBC-779	Building 779 (UBC-779)	HRR[1]	-	-	-
NA	IA	UBC-865	Building 865 (UBC-865)	HRR[1]	-	-	-
NA	IA	UBC-881	Building 881 (UBC-881)	HRR[1]	-	-	-
NA	IA	UBC-883	Building 883 (UBC-883)	HRR[1]	-	-	-
NA	IA	UBC-886	Building 886 (UBC-886)	HRR[1]	-	-	-
NA	IA	UBC-887	Building 887 (UBC-887)	HRR[1]	-	-	-
NA	IA	UBC-889	Building 889 (UBC-889)	HRR[1]	-	-	-
NA	IA	UBC-991	Building 991 (UBC-991)	HRR[1]	-	-	-

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1 *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June, 1992

2 *Annual Update for the Historical Release Report,* RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, CO, September, 1996

3 *Annual Update for the Historical Release Report*, RF/RMRS-97-073 UN, Rocky Flats Environmental Technology Site, Golden, CO, September, 1997

4 EPA, 1992 Correspondence to R Schassburger, DOE RFO, from M Hestmark, EPA Region VIII, RE Potential Area of Concern Needing Further Investigation, December 23

5 *Historical Release Report Second Quarterly Update, October 1, 1992 to January 1, 1993*

6 *Historical Release Report, Third Quarterly Update, January 1, 1993 to April 1, 1993*

7 *Annual Update for the Historical Release Report,* RF/RMRS-98-269 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

8 *Historical Release Report, Fourth Quarterly Update, April 1, 1993 to July 1, 1993*

9 *Historical Release Report, Seventh Quarterly Update, January 1, 1994 to March 31, 1994*

10 *Historical Release Report, Fifth Quarterly Update, July 1, 1993 to October 1, 1993*

11 *Historical Release Report, Tenth Quarterly Update, October 1, 1994 to December 31, 1994*

12 *Corrective Action Decision/Record of Decision for OU16 Low Priority Sites,* Rocky Flats Environmental Technology Site, Golden, CO August, 1994

13 *Historical Release Report, Ninth Quarterly Update, July 1, 1994 to September 30, 1994*

14 *Operable Unit 11 Final Combined Phases RFI/RI Report,* Rocky Flats Environmental Technology Site, Golden, CO, June, 1995

15 *Historical Release Report, Eighth Quarterly Update, April 1, 1994 to June 30, 1994*

16 *Historical Release Report, Sixth Quarterly Update, October 1, 1993 to January 1, 1994*

17 *Historical Release Report, Twelfth Quarterly Update, April 1, 1995 to June 30, 1995*

18 *Historical Release Report, Eleventh Quarterly Update, January 1, 1995 to March 31, 1995*

19 CDPHE, 1998, *Excavated Soil Adjacent to Building 701 (cc mail from C Spreng to L Brooks),* Rocky Flats Environmental Technology Site, Golden, CO, July

20 *Corrective Action Decision/Record of Decision, Operable Unit 1 881 Hillside Area, IHSS 119 1*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, February, 1997

21 *Corrective Action Decision/Record of Decision for OU 15 Inside Building Closures*, Rocky Flats Environmental Technology Site, Golden, CO, August, 1995

22 *Final Corrective Action Decision/Record of Decision Declaration, Operable Unit 3,* Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July, 1997

23 *Annual Update for the Historical Release Report,* RF/RMRS-99-428 UN, Rocky Flats Environmental Technology Site, Golden, CO, September, 1999

24 *Historical Release Report, First Quarterly Report submitted September 30, 1992*

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Appendix 2
Correspondence

Colorado Department
of Public Health
and Environment

July 9, 1999

Mr Joe Legare
RFCA Coordinator
Department of Energy-RFFO
P O Box 928
Golden CO 80402-0928

RE Annual Update for the Historical Release Report (September 1997)

Dear Mr Legare

The Colorado Department of Public Health and Environment (CDPHE) and the Environmental Protection Agency (EPA) have reviewed the 1997 Annual Update for the Historical Release Report CDPHE and EPA are providing the attached comments and are also responding to recommendations for No Action or No Further Action (NFA) by categorizing each PAC/IHSS into three groups 1 Concur with NFA, 2 More information required, and 3 Do not concur with NFA To adequately justify NFA, each recommendation should include the specific criteria from RFCA Appendix 6 (as also described in the RFCA Implementation Guidance Document) which allow NFA to be proposed If the justification is based on specific measurements or risk evaluations, then those values, exposure scenarios, etc should be extracted from the original data source and summarized in text or tables The adequacy of QA/QC that was performed on analyses should also be mentioned In some cases, providing maps showing sampling locations would make a review of the narratives more complete and efficient

1 The agencies concur with the recommendation for NFA for the following PACs/IHSSs

300-715	400-191	800-107
700-1115	600-117 3	800-145
NE-111 1	600-152	800-147 2
NE-156 2	800-102	900-113
NE-167	800-103	900-119 1
SE-209	800-104	900-119 2
300-135	800-105 1	900-130
300-151	800-105 2	900-141
300-181	800-106	900-210
300-188		

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2 The agencies require more information to be able to approve NFA for the following PACs/IHSSs

900-1307	SW-133 6	600-189
NE-110	SW-1701	600-1001
NE-216 2	300-156 1	700-123 1
NE-216 3	600-164 1	700-1102
SW-133 5		

3 The agencies do not concur with the recommendation for NFA for the following PACs/IHSSs

NE-142 1	NE-142 6	SE-142 10
NE-142 2	NE-142 7	SE-142 11
NE-142 3	NE-142 8	900-183
NE-142 4	NE-142 9	900-109
NE-142 5		

If you have any questions concerning these comments, please contact Carl Spreng at 303-692-3358 or Gary Kleeman at 303-312-6246

Sincerely,

Steven H Gunderson
RFCA Project Coordinator
Colorado Department of Public
Health and Environment

Tim Rehder
Rocky Flats Project Manager
Environmental Protection Agency

cc Norma Castañeda, DOE
Laura Brooks, K-H
Nick Demos, RMRS
Dan Miller, AGO
Steve Tarlton, CDPHE-RFOU
Susan Chaki, CDPHE

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Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
and
Environmental Protection Agency

comments on

Annual Update for the Historical Release Report
September 1997 (Rev 0)
(RF/RMRS-97-073.UN)

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1 PAC 300-715
This narrative should identify the specific NFA criteria used to justify the NFA recommendation In this case, a source evaluation was conducted, which indicated that no current or potential source exists

2 PAC 700-1114
The NFA recommendation should specify that sampling indicates no current or potential source exists

3 PAC 700-1115
The "RFCA UST cleanup thresholds" mentioned on page 12 should be identified

4 PAC 900-1307
The phrase "so that no current or potential source exists" should be added to the NFA recommendation A summary of the analytical results (chemical and radiological) which confirmed the removal of contaminated soil must be included

5 PAC NE-110 (IHSS 110)
The Physical/Chemical Description of Constituents Released section on page 17 describes conditions and level of knowledge prior to the remedial action It should be updated based on knowledge gained from taking the action

The "black material" mentioned in the second paragraph on page 18 should be identified as depleted uranium

The statement on page 18 that, "disposal of the 2,400 gallons of water and lathe coolant from Building 444 occurred in another trench and not T-3" should be documented and considered in determining the Environmental Restoration rankings for the remaining East Trenches

The justification for NFA should be that remaining contaminant levels are below action levels However, the stated action levels ("cleanup values") have recently been modified as a part of the annual review process The Tier I action levels for carbon tetrachloride

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and tetrachloroethene (PCE) are 3 56 mg/kg and 3 15 mg/kg respectively Therefore, one of the verification samples for PCE exceeds the Tier I action level and all three detections for PCE and the one for carbon tetrachloride exceed the Tier II action level. The text should be revised to state that, "These cleanup values were also consistent " Leaving levels above Tier II action levels requires an explanation of how these levels are not expected to cause surface water to exceed standards This explanation can refer to the condition in the PAM that source removal in the trench would be considered complete if verification samples were below cleanup levels or upon reaching groundwater or bedrock The rationale for this condition was that any remaining contamination beyond these criteria would be subject to groundwater remediation

The first statement in the Comments section should be revised to state, "Trenches T-1 through T-13 "

6 PAC-111 1 (IHSS 111 1)
The last sentence on page 21 should be revised to state that, "A letter to EPA "

The 2,400 gallons of water and lathe coolant from Building 444, which are mentioned on page 20 as being disposed of in one of the East Trenches, has not been found in any of the trenches excavated so far This should be considered when determining the Environmental Restoration rankings for the remaining East Trenches

The justification for NFA should be that remaining contaminant levels in subsurface soil are below action levels However, the stated action levels ("cleanup values") have recently been modified as a part of the annual review process The Tier I action levels for trichloroethene (TCE) tetrachloroethene (PCE) are 3.28 mg/kg and 3 15 mg/kg respectively Therefore, the trench bottom verification samples exceed the Tier I action level for TCE or PCE in primary grids 26, 29, 30, and 32 All detections above quantitation limits exceed Tier II action levels The text should be revised to state that, "The cleanup values stipulated in the PAM (DOE, 1996c) were also consistent. " The agreement among the agencies concludes that the conditions for source removal in the PAM had been met once bedrock or groundwater was reached The rationale for this condition was that any remaining contamination beyond these criteria would be subject to groundwater remediation The changes to action levels does not affect the agreement among the agencies

The approval of this NFA recommendation may need to be reviewed if radionuclide soil action levels are revised in the future

7 PACs NE-142 1, NE-142 2, NE-142 3, & 142 4 (IHSSs 142.1, 142.2, 142.3, & 142.4)
Since this series of ponds serve as contaminant sinks and will continue to receive contaminants from the Site, particularly during continuing D&D and ER activities, it is premature to consider them for NFA In addition, there is uncertainty about how the ponds will be used/managed in the future

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Instead of mentioning "low levels of radioactivity" on page 29, specific activity levels should be stated On page 32, the "current and future onsite receptors" should be specified The statement on page 33 that indicates that the OU 6 CAD/ROD is being prepared can be deleted

8 PACs NE-142.5, NE-142 6, NE-142 7, NE-142 8 & 142 9 (IHSSs 142 5, 142 6, 142 7, NE-142 8 & 142 9)

Since this series of ponds will continue to receive contaminants from the Site, particularly during continuing D&D and ER activities, it is premature to consider them for NFA It is also uncertain as to how the ponds will be managed in the future

On page 39, the "current and future onsite receptors" should be specified The statement on page 40 that indicates that the OU 6 CAD/ROD is being prepared can be deleted

9 PAC NE-156 2 (IHSS 156 2)

The NFA justification should be that the AOC that included this PAC has passed the CDPHE conservative screen

10 PAC NE-167.1 (IHSS 167 1)

The discussion on page 46 concerning the risk evaluation should identify the one current and four future receptors referred to by the statement, "all current and future onsite receptors " In Table 3, the units for two of the contaminants are expressed in units of volume rather than in units of mass as is usual

11 PACs NE-216 2 & NE-216.3 (IHSSs 216 2 & 216 3)

The text on page 50 discussing NFA justification must be more specific The statement that contamination associated with these IHSSs poses "no significant risk" is inadequate. The "remediation goals" to which the chromium concentrations were compared must be identified If these goals are the PPRGs, the most recently revised PPRGs should be reviewed The text should also report the measured radionuclide activity levels which support the statement that the surface soils are below levels which would produce a 15 mrem/year dose to an open space user The 15 mrem/year dose to an open space user was not established as a Tier I action level since it is an order of magnitude greater than the 85 mrem dose to a resident Therefore, the significance of comparing to that level is unclear and does not constitute grounds for NFA

12 PACs NE-142 10 & NE-142.11 (IHSSs 142.10 & 142 11)

Since this series of ponds serve as contaminant sinks and will continue to receive contaminants from the Site, particularly during continuing D&D and ER activities, it is premature to consider them for NFA In addition, there is uncertainty about how the ponds will be used/managed in the future

The "SE" prefix should be removed from the IHSS Reference Numbers on page 51 The "low levels of radioactivity" mentioned on page 52 should be specified On page 53, the "current and future onsite receptors" should be identified

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13 PAC SE-209 (IHSS 209)
The boundary for this IHSS does not contain the entire disturbed area evident on aerial photographs

14 PAC SE-133 5 (IHSS 133 5)
The discussion of the recommendation for NFA on page 59 should identify the "contaminants associated with the incinerator facility " The text should also report the measured radionuclide activity levels which support the statement that the surface soils are below levels which would produce a 15 mrem/year dose to an open space user The 15 mrem/year dose to an open space user was not established as a Tier I action level since it is an order of magnitude greater than the 85 mrem dose to a resident Therefore, the significance of comparing to that level is unclear and does not constitute grounds for NFA

15 PAC SE-133.6 (IHSS 133.6)
On page 59, the discussion of the recommendation for NFA should identify the "contaminants associated with the Concrete Wash Pad " The text should also report the measured radionuclide activity levels which support the statement that the surface soils are below levels which would produce a 15 mrem/year dose to an open space user The 15 mrem/year dose to an open space user was not established as a Tier I action level since it is an order of magnitude greater than the 85 mrem dose to a resident Therefore, the significance of comparing to that level is unclear and does not constitute grounds for NFA

16 PAC SW-1701 (IHSS 1701)
In the discussion of the recommendation for NFA on page 63, the "contaminants associated with the suspected ash pit finding" should be identified The text should also report the measured radionuclide activity levels which support the statement that the surface soils are below levels which would produce a 15 mrem/year dose to an open space user The 15 mrem/year dose to an open space user was not established as a Tier I action level since it is an order of magnitude greater than the 85 mrem dose to a resident Therefore, the significance of comparing to that level is unclear and does not constitute grounds for NFA

17 PAC 300-151 (IHSS 151)
Since sampling indicates no current source exists, that is the NFA criterion that applies

18 PAC 300-156 1 (IHSS 156 1)
The justification for NFA cannot be based on "All analytical data were below PRGs " This fact may allow for NFA justification based on a comparison to action levels (PPRG values are used as action levels for surface soil and for inorganics in subsurface soil), or through a risk evaluation This section recommending NFA should include a summary of the analytical data which shows, by comparison to action levels or through a risk evaluation, that a NFA criterion is met

19 PAC 400-191 (IHSS 191)
The "exposure conditions" used to evaluate the "threat of adverse health effects" should be provided

20 PACs 600-117.3 & 600-152 (IHSSs 117.3 & 152)
The presumed disposal of contaminated asphalt in the East Trenches should be noted for Environmental Restoration Ranking.

21 PAC 600-164.1 (IHHS 164.1)
The statement on page 90 that "there were no detections above PRGs " does not specify either the values of the detections or the exposure scenario of the PRGs This IHSS will likely qualify for one or more of the NFA criteria once this information is provided

22 PAC 600-189 (IHSS 189)
Since the location and quantities of acid releases are not documented, it is implausible to state on page 93 that "small amounts of acid spilled " The evidence and basis for proposing that the cumulative hazard indices for noncarcinogenic health effects are less than or equal to precisely 0 01 are also unclear Neutralization may well have rendered the acid harmless and a few pH verification measurements would be relatively inexpensive and could support an NFA based on the lack of a current source

23 PAC 600-1001
The agencies concur that the source of the June 23, 1997 occurrence no longer exists and that this portion therefore qualifies for NFA The rest of this PAC requires further investigation, as stated

24 PAC 700-123.1 (IHSS 123.1)
The statement on page 100 that, "No threat of adverse health effects exist under the exposure conditions evaluated" leaves the exposure scenario applied unspecified The referenced OU 8 Data Summary Report is unavailable in the State records If this report indicates that essentially no contamination remained when this IHSS was sampled, then the relevant NFA criterion is that no current source exists

25 PAC 700-1102
The updated subsurface soil action levels for Araclor 1260 are 5 31 mg/kg (Tier II) and 531 mg/kg (Tier I) Since the 70 ppm left in the subsurface exceeds the Tier II limit, an evaluation is required to determine if this level is protective of surface water and ecological resources

26 PAC 800-147.2 (IHSS 147.2)
The applicable criterion for no action is that sampling indicates that no source exists or that measured contaminant levels are below action levels for the appropriate medium

27 PAC 900-109 (IHSS 109)
The thermal desorption unit performance standards referenced in the NFA recomendation

are not a NFA criterion Neither are the PPRGs for a construction worker scenario, which are referenced in the Closeout Report for this IHSS Analytical results of confirmation samples along the south wall of the trench exceed current Tier II action levels for several VOCs PCE, TCE, toluene, and ethylbenzene This exceedance requires an evaluation of the impacts of these remaining contaminants on surface water and ecological resources The south wall confirmation samples also exceed the Tier I action levels for PCE and TCE This IHSS cannot, therefore, be considered for NFA

28 PAC 900-113 (IHSS 113)

The justification for NFA needs to additionally state that by meeting the PAM objectives, specific NFA criteria were also met At the top of page 135, IHSS 113 is referred to as PAC NE-113 rather than PAC 900-113

29 PAC 900-130 (IHSS 130)

The northing for the approximate location should apparently be N748,000 rather than N746,000 In three instances in the text, this IHSS is referred to as PAC 800-130 rather PAC 900-130 as in the title and in the Table of Contents The meaning and relevance of the second sentence at the top of page 145 is unclear, particularly its reference to PAC 800-145

30 PAC 900-141 (IHSS 141)

The statement on page 147 that, "In June 1973, air samples . were unusually high .." is vague and should specify the contaminant and the measurement The HHRA results indicate that the AOC which includes IHSS 141 would pass a risk evaluation and the CDPHE Conservative Screen This should be stated as the NFA justification This discussion should also mention which specific current and future onsite receptors the HHRA assessed The Comment section mentions that the PAC boundary was extended to include the area of the sludge drying beds This seems to be in contrast to the Fate of Constituents Released to Environment section which states that this area is being investigated as a separate action.

31 PAC 900-183 (IHSS 183)

One nearby borehole is not sufficient to characterize this building which contained toxic gases This IHSS should be treated similarly to other IHSSs associated with buildings. Once the 903 Lip Area remediation allows access and the building is down, the slab can be tested (e g , rinsate sampling or chips) If warranted by these tests, additional soil samples adjacent to or under the slab can be analyzed

32 PAC 900-210 (IHSS 210)

"No positive detections" indicates that the appropriate no action justification for this IHSS is that no current or potential source could be found

Colorado Department
of Public Health
and Environment

July 9, 1999

Mr Joe Legare
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Department of Energy-RFFO
P O Box 928
Golden CO 80402-0928

RE· Annual Update for the Historical Release Report (September 1998)

Dear Mr Legare

The Colorado Department of Public Health and Environment (CDPHE) and the Environmental Protection Agency (EPA) have reviewed the 1998 Annual Update for the Historical Release Report CDPHE and EPA are providing the attached comments and are also responding to recommendations for No Action or No Further Action (NFA) by categorizing each PAC/IHSS into three groups 1 Concur with NFA, 2 More information required, and 3 Do not concur with NFA To adequately justify NFA, each recommendation should include the specific criteria from RFCA Appendix 6 (as also described in the RFCA Implementation Guidance Document) which allow NFA to be proposed If the justification is based on specific measurements or risk evaluations, then those values, exposure scenarios, etc should be extracted from the original data source and summarized in text or tables The adequacy of QA/QC that was performed on analyses should also be mentioned In some cases, providing maps showing sampling locations would make a review of the narratives more complete and efficient

1 The agencies concur with the recommendation for NFA for the following PACs/IHSSs

700-1117	NW-203	400-800
NE-1405	NW-1500	400-811
NE-1406	000-172	700-150 5
NW-174B	100-608	

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2 The agencies require more information to be able to approve NFA for the following PACs/IHSSs

NW-170	NE-1404	900-1318
500-169		

3 The agencies do not concur with the recommendation for NFA for the following PAC/IHSS

NW-174A	900-140

If you have any questions concerning these comments, please contact Carl Spreng at 303-692-3358 or Gary Kleeman at 303-312-6246

Sincerely,

Steven H Gunderson
RFCA Project Coordinator
Colorado Department of Public Health and Environment

Tim Rehder
Rocky Flats Project Manager
Environmental Protection Agency

cc Norma Castañeda, DOE
Laura Brooks, K-H
Nick Demos, RMRS
Dan Miller, AGO
Steve Tarlton, CHPHE-RFOU
Susan Chaki, CDPHE

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Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
and
Environmental Protection Agency

comments on

Annual Update for the Historical Release Report
September 1998 (Rev. 0)
(RF/RMRS-98-269.UN)

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1 PAC 700-1117

The NFA criterion is that analytical results for all contaminants are below Tier II action levels

2 PAC NE-1404

Analytical data are described in the text as being from the excavated soil The data sheet, however, indicates a water matrix BTEX and TPH analyses should be performed on the remaining soil to confirm the assumption that no source remains

3 PAC NW-170 (IHSS 170)

A review of this narrative suffers from a lack of primary data available to the agencies The referenced Data Summary Report (RMRS, 1997) is not in the CDPHE records and presumably was not submitted to the State or to EPA The "internal investigation report" that was generated following the "unknown powder incident" in 1987 is also not available

While the soil-gas survey reported in Technical Memorandum 1 detected acetone, benzene, methane, tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene, the analytical results for subsurface soil in Table 1 of this narrative reports analyses for only methylene chloride and naphthalene The last sentence of the first paragraph on page 27 is unclear since the Tier I action level for naphthalene in subsurface soil is 1 01 x 10^4 mg/kg It is expected that the detected amounts of trichlorotrifluoroethane are below hazardous levels Slope factors for this compound are not available in sources used for PPRG calculations (IRIS, HEAST, etc)

The NFA recommendation states that VOC concentrations in subsurface soil are below Tier I action levels The 1997 Data Summary Report needs to be provided so that the subsurface soil concentrations can be checked against the new Tier II subsurface soil action levels The NFA recommendation can also mention that the analytical results for surface soil reported in Technical Memorandum 1 are all below Tier II action levels for surface soil Once the above-mentioned data has been provided for review, it is expected that this IHSS can be approved for no further action

4 PAC NW-174A and NW-174B (IHSS 174)

The referenced Data Summary Report (RMRS, 1997) is not in the CDPHE records and presumably was not submitted to the State or EPA. The action levels mentioned in the discussion of the results of this report have been revised The PCE concentration in Borehole 17497 exceeds the new Tier I subsurface soil action level of 3,150 µg/kg which triggers a removal action The groundwater in this same borehole exceeds the Tier I PCE action level, so that the necessity of an action to protect surface water must be evaluated The TCE subsurface soil concentration in Borehole 18997 exceeds the new Tier II action level of 32 8 µg/kg which likewise requires an evaluation of impacts to surface water

Particularly since the Draft Summary Report is unavailable, the isotopic results for the surface soil analyses, as well as the background values against which they were measured, should be included in the narrative In spite of "administrative controls to prevent radioactively contaminated material from being shipped to the yard," the "unknown powder incident" described in the IHSS 170 narrative occurred in 1987 External radiation monitoring did not prevent storage of radioactively-contaminated materials with at least moderate activity levels

The exceedances of Tier I subsurface soil and groundwater action levels at IHSS 174A precludes a NFA recommendation The agencies can consider the NFA recommendation for IHSS 174B once the 1997 Draft Summary Report is provided

5 PAC NW-203 (IHSS 203)

The surface soil action levels for cobalt, copper, vanadium, Aroclor 1254, and Aroclor 1260 listed in Table 1 on page 38 have been modified slightly as part of the PPRG annual review process The reported analytical results are still well below the revised action levels

6 PAC 000-172 (IHSS 172)

The referenced OU 8 Data Summary (DOE, 1995) is not in the CDPHE records and presumably was not submitted to the State In Table 1, the correct Tier II surface soil action level for benzo(a)pyrene is 0 784 mg/kg

7 PAC 100-608

The criterion for NFA should be that no current or potential source in soils has been detected

8 PAC 400-800

The cleanup levels in TSCA guidance are not established as NFA criteria The criterion for NFA should be that the PCB concentrations are all below Tier II action levels

9 PAC 400-811

The cleanup levels in TSCA guidance are not established as NFA criteria The criterion for NFA should be that the PCB concentrations are all well below Tier I action levels All PCB analyses, with the exception of Araclor 1248, are below Tier II action levels as

well The highest Araclor 1248 concentration is barely above that action level so no action is required

10 PAC 500-169 (IHSS 169)

The agencies concur that it is reasonable to conclude that no current or potential threat exists due to the possible spill of hydrogen peroxide However, information in this narrative alluding to a buried drum suggests that other drums, possibly with more hazardous constituents, may have been buried in the area Before potential drum burial sites such as the chemical storage yard are considered for NFA, characterization activities should include attempts to locate buried drums The referenced OU 13 documents indicate that no efforts to locate potentially buried drums were conducted or proposed

11 PAC 900-140 (IHSS 140)

The list of metal COCs does not correspond with the list of metallic compounds and residues known to have been buried at this site Possible conclusions are that boreholes were not suitably located or that the list of metals handled at the site is incomplete Sampling in IHSS 140 appears to have occurred around the periphery rather than in the middle of the IHSS raising concerns that contamination may have been missed Several of the isoconcentration maps in the OU 2 report appear to indicate a source in IHSS 140 for several contaminants seen in the Alluvial/Colluvial UHSU flow system

The phrase, "in µg/Kg", should be deleted from the heading for Table 1 on page 86 since this differs from the units given in the table itself This table should show that, according to the OU 2 RFI/RI Report, carbon tetrachloride, cis-1,3-dichloropropene, methylene chloride, tetrachloroethene, and trichloroethene exceed the new Tier II action levels for subsurface soil The reported range of values for arsenic exceeds the Tier II action level for open space use The collection of composite samples, rather than discrete samples, in the boreholes (over a 6-foot interval for all but the VOC analyses), which may have diluted the levels of contamination, is also a concern

12 PAC 900-1318

The phrase "so that no current or potential source exists" should be added to the NFA recommendation A summary of the analytical results (chemical and radiological) which confirmed the removal of contaminated soil must be included

Appendix 3
Areas of (Non RFCA) Soil Put-back

Appendix 4
Plates

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: RF/RMRS-99-428.UN)

Annual Update Historical Release Report (HRR)

(For August 1, 1998 through August 1, 1999)

September 1999

Plate 1:

Individual Hazardous Substance Sites by Consolidated Operable Unit

As of September 1999

Map ID: 99-0183-COU

September 24, 1999

CERCLA Administrative Record Document, SW-A-003379

U S DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref· RF/RMRS-99-428.UN)

Annual Update Historical Release Report (HRR)

(For August 1, 1998 through August 1, 1999)

September 1999

Plate 2:

No Further Action Individual Hazardous Substance Sites and Potential Areas of Concern

(Including Proposed NFAs)
As of September 1999

Map ID: 99-0183-NFA

September 24, 1999

CERCLA Administrative Record Document, SW-A-003379

U S DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: RF/RMRS-99-428 UN)

Annual Update Historical Release Report (HRR)

(For August 1, 1998 through August 1, 1999)

September 1999

Plate 3:

Original Process Waste Lines and New Process Waste Lines

As of September 1999

Map ID: 99-0183-OPWL

September 24, 1999

CERCLA Administrative Record Document, SW-A-003379

U S DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

THIS TARGET SHEET REPRESENTS AN OVER-SIZED MAP / PLATE FOR THIS DOCUMENT·
(Ref· RF/RMRS-99-428.UN)

Annual Update Historical Release Report (HRR)

(For August 1, 1998 through August 1, 1999)

September 1999

Plate 4:

Potential Areas of Concern and Under Building Contamination Sites

As of September 1999

Map ID: 99-0183-PAC

September 27, 1999

CERCLA Administrative Record Document, SW-A-003379

U S DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

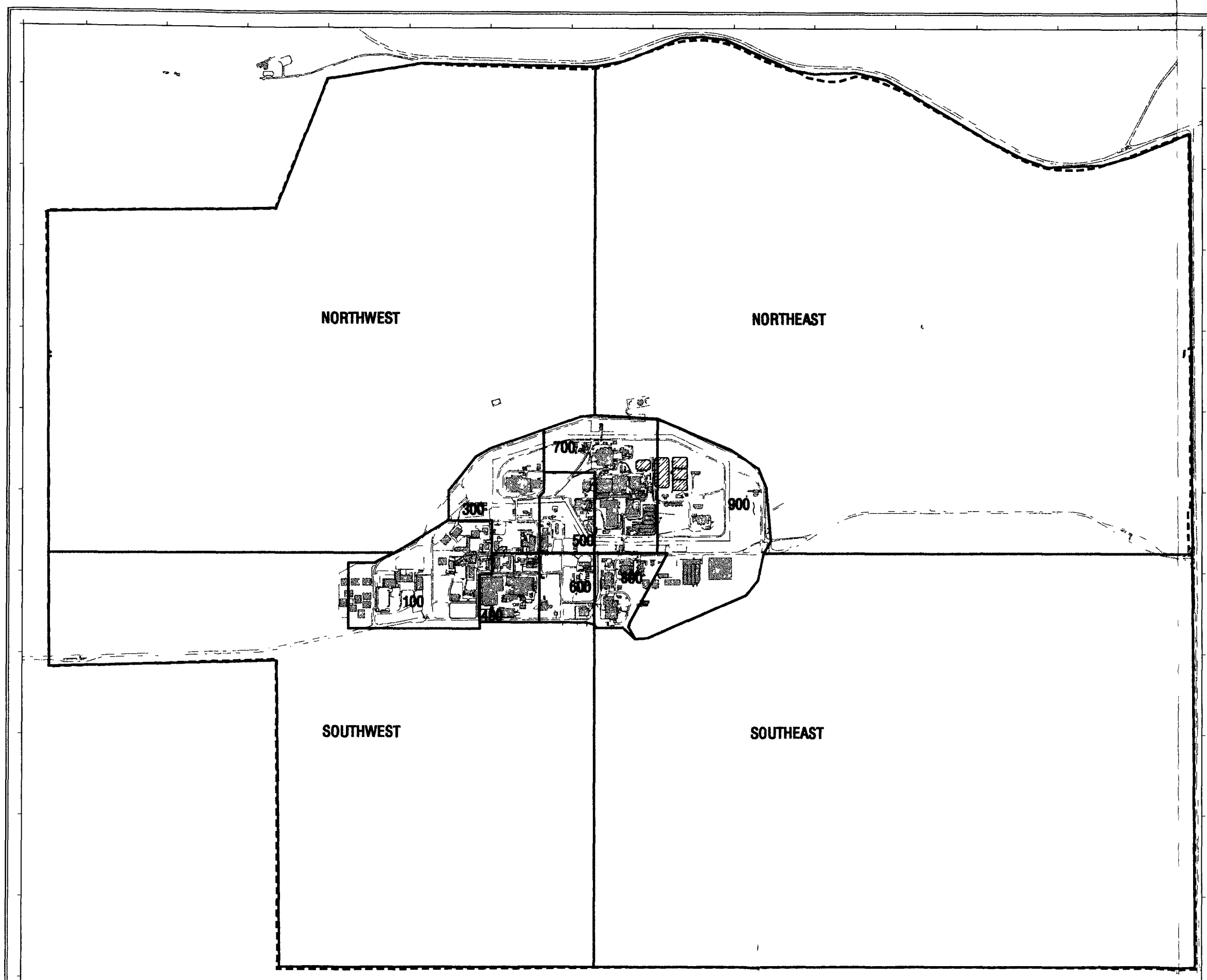

Figure 1 1
1999 Historical Release Report
PAC Area Boundaries

LEGEND

- Buildings & ther structures
- Road
- Ro ky Flats Boundary
- PAC Are Designatio Boundary

NOTE
PAC Areas with 000 prefix such as PAC 000-121 (Original Proces Waste Lines) cros other PAC boundary lines and are not shown on this Figur

PAC Areas with OFFSITE prefix such as OFFSITE IHSS-199 200 201 and 202 (Operable Unit 3) are not shown on this Figure due to scale

N

Scal 1 20450
1 ch ep sent app ximat ly 1704 feet

0 0 000 2000ft

Stat Plane Coo di ate Project o
Colo ado Ce t al Z
Dat m NAD27

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Rocky Flats Environmental Technology Site

Prepared by:
RMRS Rocky Mountain Remediation Services, L.L.C
Geograph Information Systems Group
Rocky Flat ron ent sch olog Site
Box 464
golden CO 80402-0464

MAP ID: 98-0241 September 17 1999

NT S /p j /fy98/98 0254/p /m p14d/p b d t ml

15

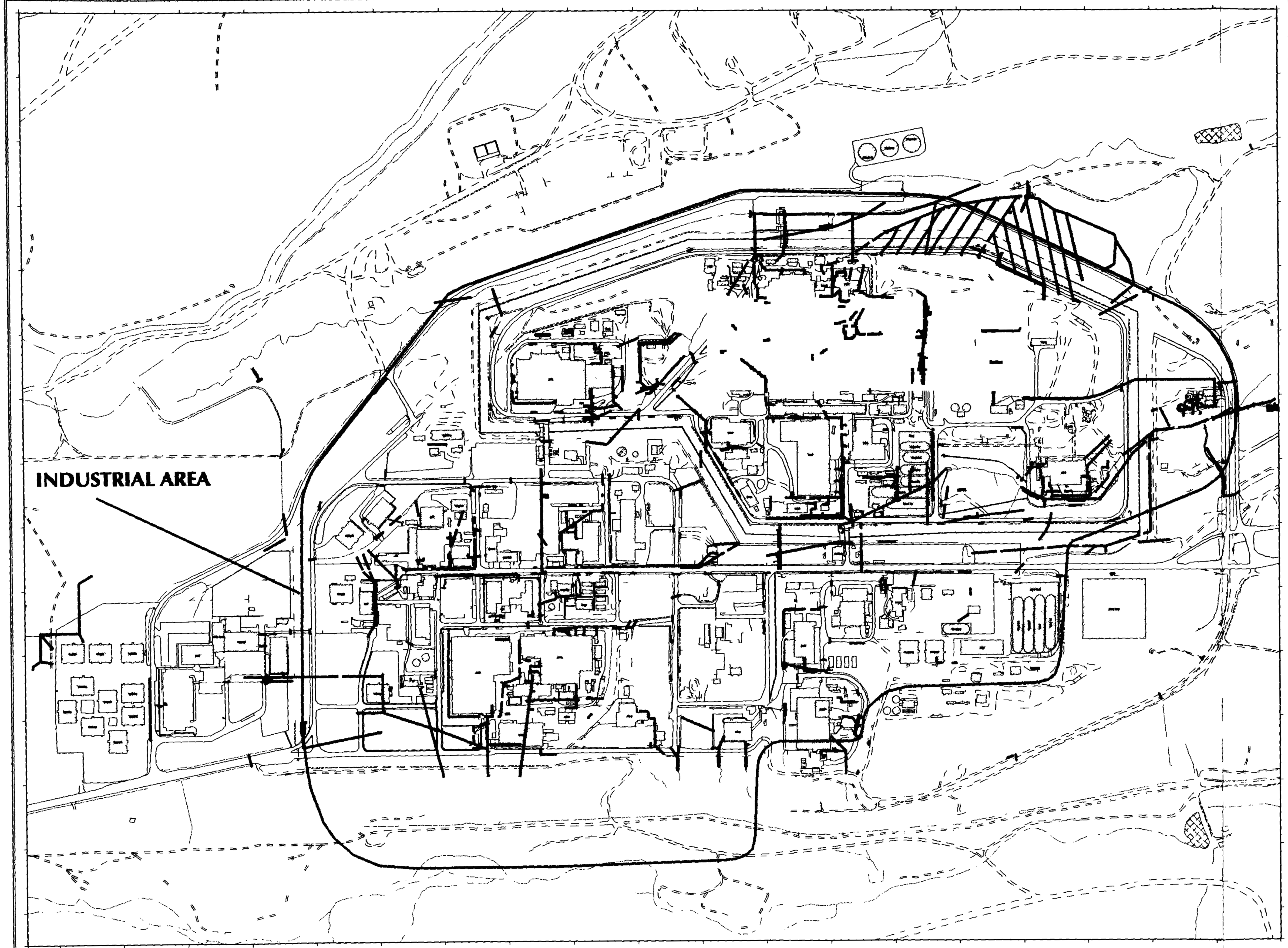

Figure 2 1
Storm Drams
(PAC 000-505)

IHSS Groupings

Storm Drains

Industrial Area Operable Unit Boundary

Other Map Features

Buildings nd othe structures

Solar Evaporation Ponds (SEP)

Lakes nd ponds

Streams, ditches, or other drainage features

Fences nd other barriers

Paved roads

D: roads

Scale 1 7720
1 inch represents pproxim tely 643 feet

State Plane Coord nate Projection
Colorado Central Zone
Datum NAD27

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Prepared by:
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MAP ID 99-0462-IA-STRAT-STORM September 24 1999

24

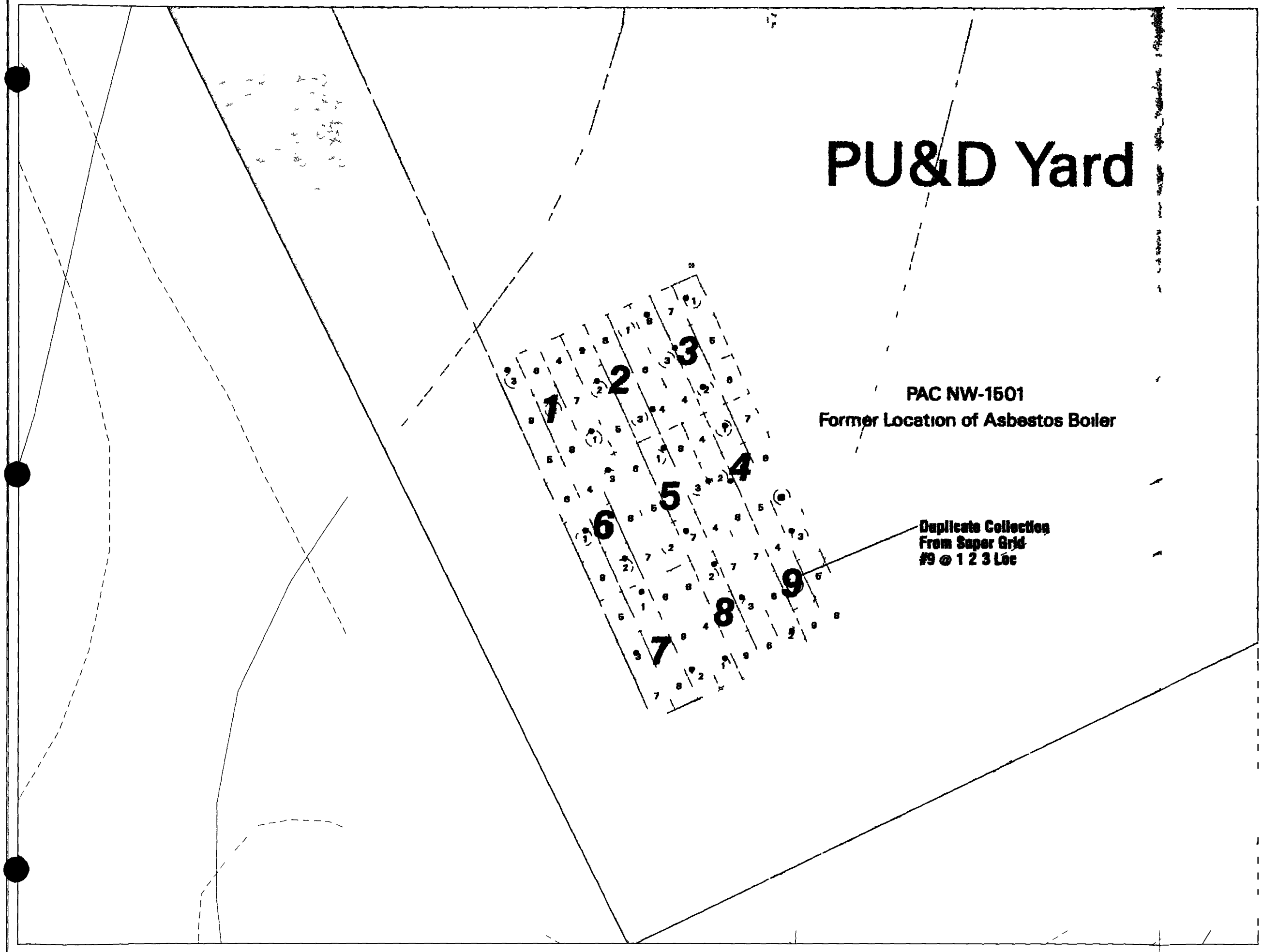

Figure 3 1

Sampling Grid

Potential Area of Concern (PAC NW 1501) Property Utilization & Disposal Yard

EXPLANATION

Composite Grid Area

- Super Grid Cell
- Sub Grid Cell
- Sample Composite Location
- GPS Surveyed Sample Location
- GPS Northwest Corner of Grid

Standard Map Features

- Buildings and other structures
- Solar Evaporation Ponds (SEP)
- Lakes and ponds
- Streams ditches or other drainage features
- Fences and other barriers
- Contour (2 Foot)
- Paved roads
- Dirt roads

Stat Plane Coordinat Projection
Colorado Central one
Datum NAD27

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MAP ID 99-0

September 27 1999

N T 8 w/p j t /fy99/99 0121/gp mp t ml

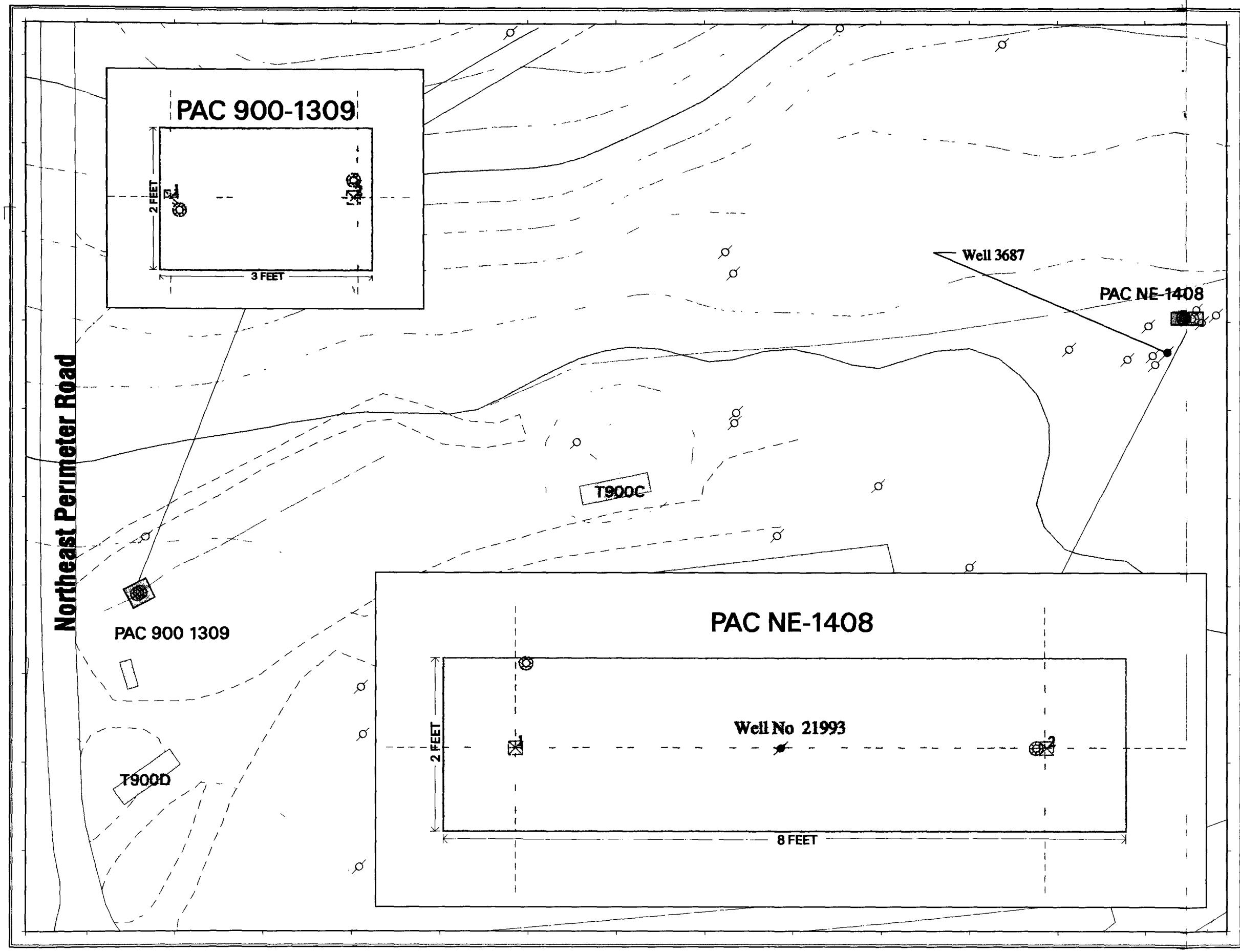

Figure 3.2

Sample Location Map
Potential Areas of Concern
PACs NE-1408 & 900-1309

EXPLANATION

- Proposed Sample Location
- Sampling Location
- Well No. 21993
- Well No. 3687
- Adjacent Well
- Sampling Grid

Potential Area of Concern

- PAC Boundary with Annotation

Standard Map Features

- Buildings and other structures
- Streams ditches, othe drainage features
- Fences and othe barriers
- Conto (5-Foot)
- Paved roads
- Dirt roads

N

Scal = 1 800
1 h present approximately 67 feet

5 0 0 0ft

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Det m NAD27

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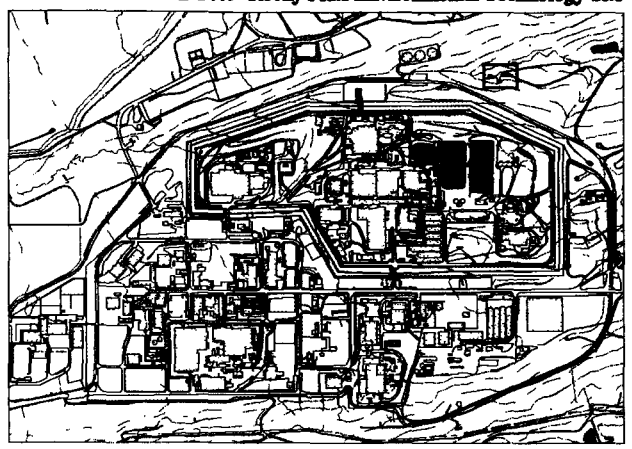
MAP ID: 99-0170 September 17, 1999

NT 8 /p | t /hyps/99 0170/ p h d t mi

Location of PAC NE-1409 Rocky Flats Environmental Technology Site



Interceptor Trench Pumphouse
(PAC NE-1409)

2 3 4 1

Figure 3.3

Sample Location Map
Potential Areas of Concern
PAC NE-1409

EXPLANATION

Sampling Location

PAC Boundary with Annotatio

Standard Map Features

Lake nd pond

Streams, ditches, othe d amag feat re

Fe and othe bar iers

Contour (2-Foot)

Paved road

D rt road

DATA SOURCE.
Buildings, fences, hydrography, roads and other miscellaneous from 1994 aerial flyover data captured by EDS, KSL, Las Vegas.
Digitized from blue prints and maps, 1995
Digital elevation model were developed from digital elevation model (DEM) data by Montana Kaufman (MK) using ESRI Arc TIN and LATTICE to generate the DEM data to create 5-Foot contours. The DEM data were captured by the Remote Sensing Lab, Las Vegas, NV, 1994 Aerial Flyover 10 meter resolution.
DEM post-processing performed by MK, Winter 1997

Scale = 1 320
1 inch ep sent app ximately 27 feet

0 0 2 40ft

State Plan Coord at Pr ject on
Colo edo Cent al Zon
Dat m NAD27

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Spatial Information Systems Group
Rocky Flat Environmental echnology
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olden, 80402-0464

MAP ID 99-0170 Septembe 17 1999

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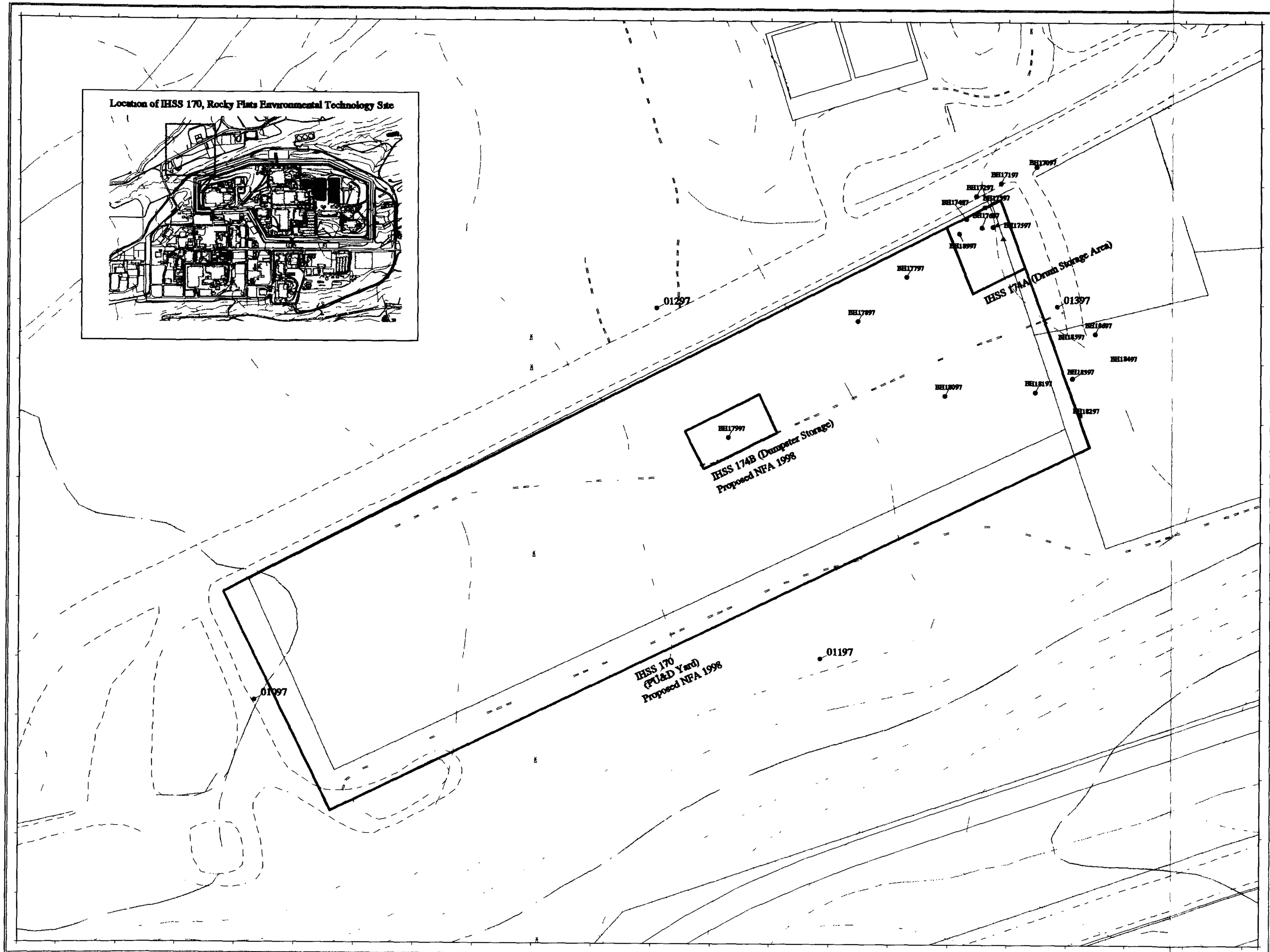

Figure 3 4

IHSS's 170, 174A & 174B Property Utilization & Storage Yard Location Map

EXPLANATION

- IHSS Boundary
- New RFCA Groundwater Monitoring Wells under FY97 WARP
- Groundwater well location
- Borehole Locations
- Power Poles
- Surface Soil Sample with Beryllium detected between RFCA Tier I and Tie II

Standard Map Features

- Buildings nd other structures
- Solar Evaporation Ponds (SEP)
- Lakes and ponds
- Streams ditches other drainage features
- Fences and othe barriers
- Contour (5-Foot)
- Paved roads
- Di roads
- Conto rs (5 foot)

Sca
Inch represents approximately feet

State Plane Coordinate Projection
Colorado Central one
Datum NAD

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Rocky Flat Enviro mental T chnology Sit

Prepared by
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MAP ID 97-0 92 September 999

NT S w/p j fy97/97 0192/fig3 4 ml

Figure 3.5

Sampling Locations from 1999 Investigation

Bowmans Pond (PAC 700-1108) and Steam Condensate Tanks (IHSS 139 1N)

North Patrol Road

BH10299

BH10199

BH10499

Building 770

PAC 700 1108

IHSS 139 1N

Investigation Area

Building 774

Sodium Hydroxide (NaOH) Product Tank

EXPLANATION

- 1999 Boreholes
- 1999 Surface Water Sampling Locatio
- Investigation Are
- PAC 700-1108
- IHSS 139 1N
- N rth Patrol Road

Standard Map Features

- Building and other structures
- Lakes and po d
- Streams, ditches, or other d ainage features
- Fences and other bar iers
- Cont (5-Foot)

Scal 1 230
1 ch repr sent appr ximately 19 feet

5 0 10 20ft

Stat Plan Coo d at Project
Col ado Cent al Zo
Datum NAD27

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Rocky Flats Environmental Technology Site

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Geograph Information Systems Group
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Box 464
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MAP ID: 99-0384

September 17 1999

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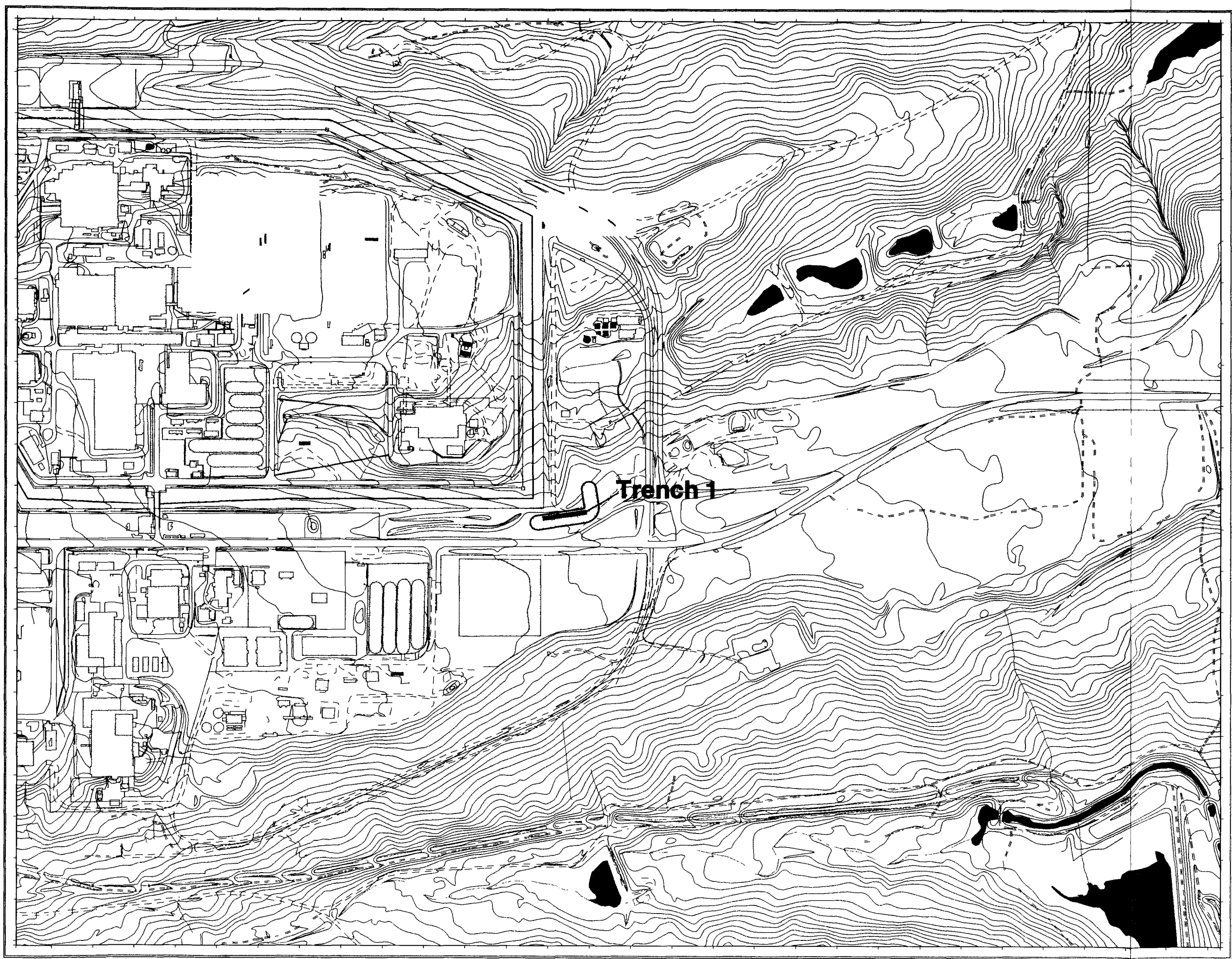

Figure 3 6

Trench 1
Site Location

EXPLANATION

- Cont urs (5 Interval)
- Trench 1 Tent
- Trench 1

Standard Map Features

- Bu ld ng and other st uct es
- Solar Evapo at o Po d (SEP)
- Lake and pond
- Streams, ditches, other d ainage features
- Fences and othe bar iers
- Paved ads
- Dirt ro d

DATA SOURCE:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/96

Best Available Copy

N

Sca 5430
Inch represents approximately feet

0 2500 5000

State Plane Coord nate Projectio
Colorado Central one
Datum NA

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Rocky Flat Envi onmental Technology S te

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Rocky Flat Environ ent tech nolog Sit
Box 464
den C 80402-0464

MAP ID 99-0000 September 17 1999

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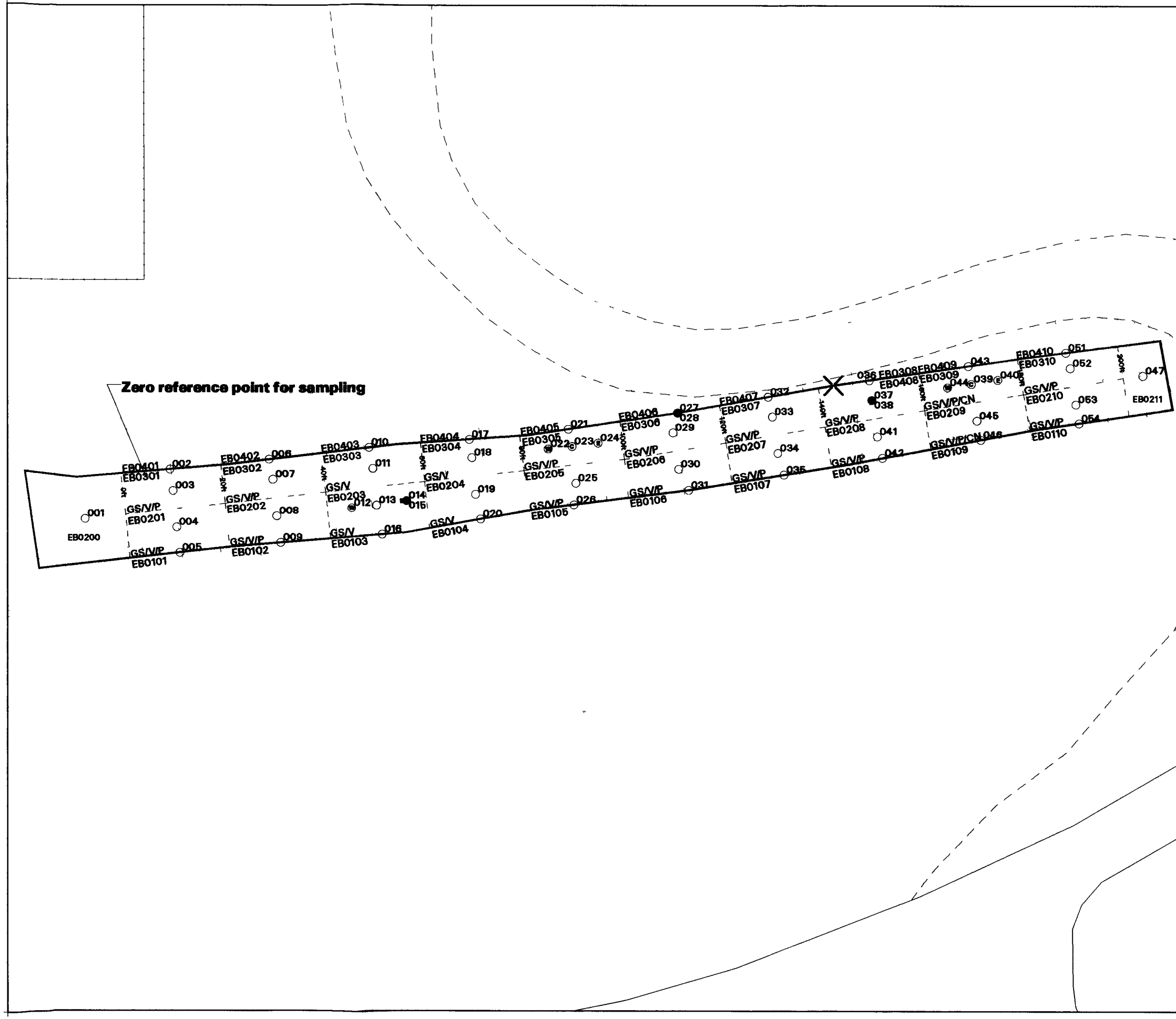

Figure 3 7
Trench 1
Excavation Verification and Sample Locations

EXPLANATION

- Location of 5-gal Containe
- Excavation Bo ndary
- Appro . Trench Gnd Location
- Tent Location
- ○ Sample Location
- ● Sample + Duplicate

EB0201 = Sample Location
052 = Abreviated Sample Number Representing 98A211-052
GS = Gamma Spectroscopy Analysis
V = Volitile Organic Compound Analysis
CN = Cyanide Analysis
P = PCBs
W = Western Third of 20 Sample Cell
C = Center Third of 20 Sample Cell
E = Eastern Third of 20 Sample Cell

Standard Map Features

- Fences and other barriers
- Paved roads
- D rt road

DATA SOURCE
Buildings, fences, hydrography, roads and other structures from 994 aerial fly-over dat captured by G&G RSI Las Vegas. Digitized from the orthophotographs. 1/95
IH 108 Boundary based survey of fence post locations

Scale = 1 240
1 i ch represents 20 feet

5 0 10 20ft

Stat Plane Coordinate Projection
Colorad Central Zone
Datum NAD27

U S Department of Energy
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Geographic Information Systems Group
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MAP ID 99-0130 September 17 1999

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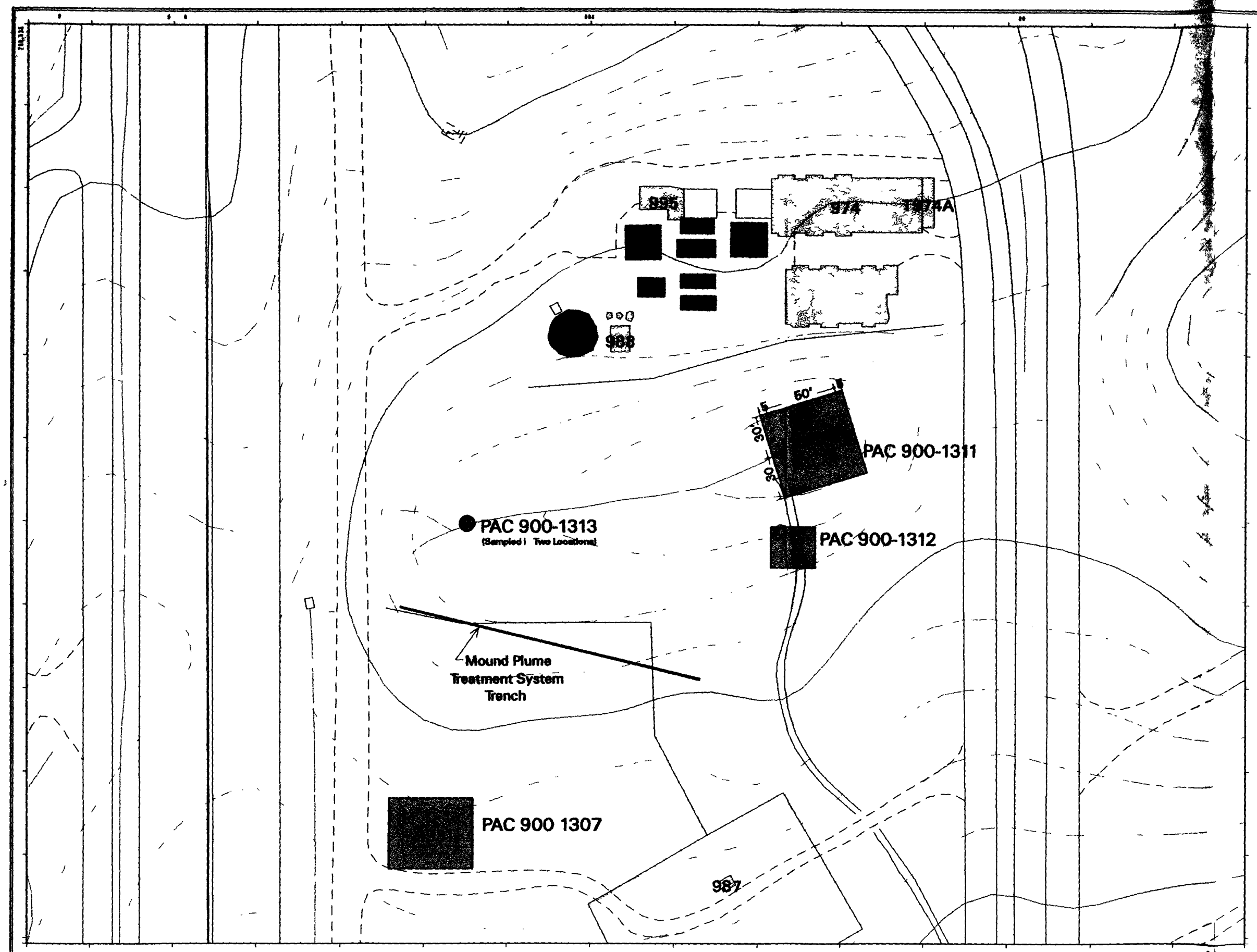

Figure 3.8

Sample Location Map
Potential Areas of Concern

PAC 900-1307
PAC 900-1311
PAC 900-1312
PAC 900-1313

Potential Area of Concern
Sampling Location
Proposed Sample Locations
Sampling Grid
Mound Plume Treatment System Trench
PAC Boundary with Annotation

Standard Map Features
Buildings and other structures
Lakes and ponds
Streams, ditches, or other drainage features
Fences and other barriers
Contour (5-Foot)
Paved roads
Dirt roads

Scale = 1 960
1 inch represents approximately 72 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27

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MAP ID: 99-0170
September 17, 1999

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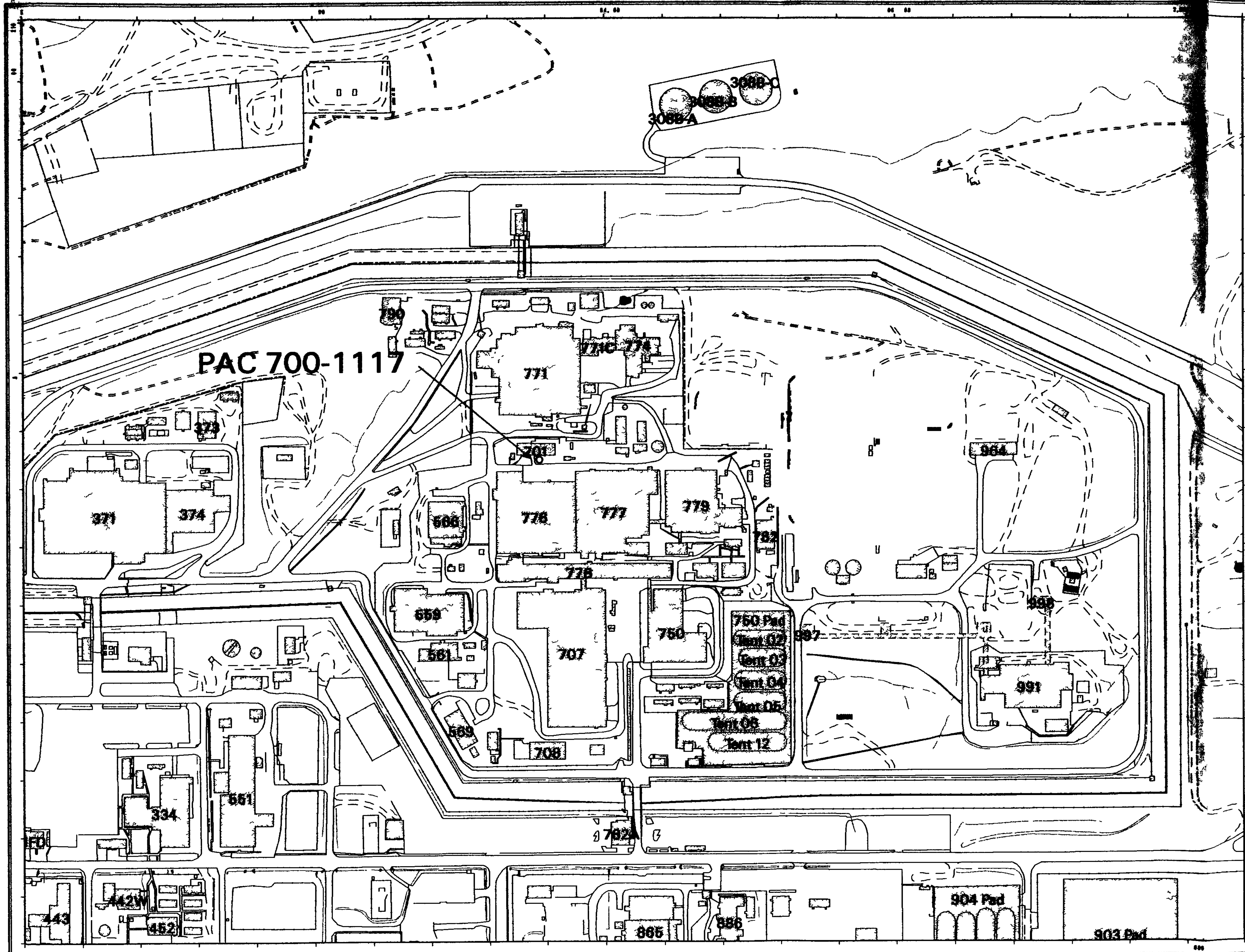

Figure A-3
(Appendix 3)

1999 Historical Release Report

Non-RFCA Generated Soils Returned to Place of Origin

EXPLANATION

○ Soil Putback Area Assigned NFA PAC Designation

Standard Map Features

- Buildings and other structures
- Solar Evaporation Ponds (SEP)
- Lakes and ponds
- Streams ditches or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads

Scale = 1 : 4090
1 inch represents approximately 341 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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MAP ID: 97-0161

September 17 1999

NT 8 w/p j t /fy97/97 0161/l t p b t ml

NORTHWEST

NORTHEAST

700

300

500

900

100

600

800

400

UBC-770
700-1108
UBC-771
UBC-774
900-1310
UBC-701
700-1100
UBC-776
UBC-777
UBC-779
700-105
300-702
700-116
700-1101
UBC-778
UBC-559
UBC-707
900-1308
500-904
500-906
500-907
UBC-528
UBC-731
UBC-991
900-1307
900-1301
NE-1407
NE-1412
NE-1413
700-1106
UBC-331
100-607
UBC-123
UBC-442
600-1004
UBC-122
100-606
UBC-441
500-802
800-1204
800-1212
UBC-889
UBC-885
UBC-886
400-804
800-1200
UBC-125
100-811
UBC-444
400-803
UBC-883
EAST FIRING RANGE
100-603
100-602
400-815
400-811
400-801
600-1001
400-807
UBC-447
400-810
800-1201
UBC-881
UBC-439
800-1205
SE-1602
UBC-440
UBC-887
TARGET AREA
SW-1702

SOUTHWEST

SOUTHEAST

Potential Areas of Concern
And Under Building Contamination Sites
Plate 4
(As of Sept. 1999)

EXPLANATION

UBC-559 — Under Building Contamination Site

900-1310 — Potential Area of Concern

NE-1407 — Potential Area of Concern Point Spill

Standard Map Features

- Buildings and other structures
- Solar Evaporation Ponds (SEP)
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads
- HRR Designation Area Boundary

DATA SOURCE:
PAC's
Historical Release Report (HRR)
2nd Annual Update
Sept. 30, 1997
Individual Hazardous Substance Sites (IHSS)
DOE 1992, HRR Report and Subsequent Updates.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95

Scale = 1 : 3600
1 inch represents 300 feet

250 0 500 1000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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Rocky Flats Environmental Technology Site

Prepared by:
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Geographic Information Systems Group
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P.O. Box 464
Golden, CO 80402-0464

MAP ID: 99-0183-PAC

September 27, 1999

Plate 3

Original Process Waste Lines and New Process Waste Lines

(As of Sept. 1999)

EXPLANATION

- Tanks of Concern
- Foamed & Stabilized Tanks (Source Removed - Interim Status)
- Remaining Tanks
- Process Waste IHSS Locations (Former OU 9 IHSSs)
- Original Process Waste Lines
- Location of Original Process Waste Lines which may have been removed.
- Approximate Location of New Process Waste Lines
- Valve Vault Locations

Standard Map Features

- Buildings and other structures
- Solar Evaporation Ponds (SEP)
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Underground Tunnels

DATA SOURCE:

Individual Hazardous Substance Sites (IHSS) DOE 1992, HRR Report and Subsequent Updates. The GIS Original Process Waste Lines (OPWL) were derived from AutoCAD files which were generated by IT Corporation from the OU-9 Workplan, Nov. 1992. The GIS Tanks associated with the Original Process Waste Lines (OPWL) were derived from DXF files which were generated by IT Corporation from the OU-9 Workplan, Feb. 1993.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G NSL, Las Vegas. Digitized from the orthophotographs. 1/95

Scale = 1 : 2400
1 inch represents 200 feet

100 0 200 400 ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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MAP ID: 99-0183-OPWL

September 24, 1999

Plate 2

No Further Action Individual Hazardous Substance Sites and Potential Areas of Concern

(Including Proposed NFAs)

(As of Sep. 1999)

NOTE:
IHSS 199, 200, 201 and 202 (Operable Unit 3) East of Indiana Street are NOT SHOWN on map due to map scale.

PAC NE-1403 at East Guard Post, Building 920, is NOT SHOWN on map due to map scale.

BUFFER ZONE
EPA LEAD

INDUSTRIAL AREA
CDPHE LEAD

SOUTHWEST

SOUTHEAST

EXPLANATION

- Operable Unit 1 (Closed through CAD/ROD Process)
- Former Operable Unit 2
- Operable Unit 5
- Operable Unit 6
- Operable Unit 7
- Former Operable Unit 8
- Former Operable Unit 10
- Operable Unit 11 (Closed through CAD/ROD Process)
- Former Operable Unit 12
- Former Operable Unit 13
- Former Operable Unit 14
- Operable Unit 15 (Closed through CAD/ROD Process)
- Operable Unit 16 (Closed through CAD/ROD Process)
- Potential Area of Concern (Proposed as No Further Action)
- No Further Action PACs approved by Colorado Department of Health and EPA in 1992.
- Foamed & Stabilized Tanks (Source Removed - RCRA Interim Status)
- Industrial Area Operable Unit Boundary
- HRR Designation Area Boundary

Standard Map Features

- Buildings and other structures
- Solar Evaporation Ponds (SEP)
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads

DATA SOURCE:

Locations of the Operable Unit(s) and their associated Individual Hazardous Substance Sites (IHSS) were derived from the DOE 1992 - HRR Report and subsequent updates.
Operable Unit(s) 1, 3, 11, 15, 16 were designated to be NFA by the Corrective Action Decision/Recom of Decision (CAD/ROD), 1996
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95

Scale = 1 : 4800
1 inch represents 400 feet

250 0 500 1000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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ADMIN RECORD
SW-A-003329
SW-171

MAP ID: 99-0183-NFA

September 24, 1999